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**RAPID AVIONICS TEST MODIFICATION
CAPABILITY**



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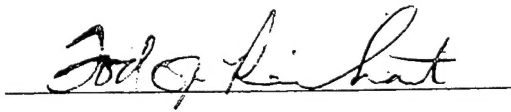
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13. ABSTRACT (Maximum 200 Words) This effort involves the research of identifying the Special Operation Forces (SOF) software/system support capabilities and requirements for the future support of SOF weapon systems. In addition, the development of a RATEMC Software Support and Test Program Set (TPS) development plan which provides a cost-effective approach for I-level maintenance for the SOF.				
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TABLE OF CONTENTS

		Page
1.	INTRODUCTION	1
1.1	Background	1
1.2	Objective	1
2	WORK PERFORMED	2
2.1	AN/ALQ-184 Electronic Countermeasures (ECM) Pod Cable Test	2
2.2	Radio Frequency Mobile Electronic Test Set (RFMETS)/Down Size Tester (DST) Cost/Benefit Analysis (CBA) Automatic Test Station Comparison Study	2
2.3	CV-22 Supportability Study	4
2.4	Calibration and Measurement Requirements Summary Study	6
2.5	Aircraft Modernization Program (AMP)/Common Avionics Architecture for Penetration (CAAP) Acquisition Strategy	7
2.6	Program Support	11
3	CONCLUSION	13
	APPENDIX A — TECHNICAL INFORMATION MEMORANDUM	A-1

1. INTRODUCTION

TASC completed its work on test program set development, automatic test equipment, field maturation testing, sustaining engineering, program support, and special studies for Special Operations Forces (SOF) requirements for intermediate and depot level maintenance support to the AC-130U, AC-130H, MC-130H, MH-53J, MH-60K, and CV-22 aircraft. Support was provided to the Integrated Product Development Teams as required for Automatic Test Equipment (ATE) and Test Program Sets (TPSs) development, testing, and sustaining engineering support. TASC provided primary support to the Integration Program Office (ASC/LUN) and secondary support to Combat Talon II, MC-130H (ASC/LUM), Gunship, AC-130U (ASC/LUU), and Helicopter/CV-22 (ASC/LUH) Program Offices.

1.1 BACKGROUND

Special Operations Forces weapon systems are constantly undergoing revisions due to rapidly changing mission requirements and availability of new technologies to maintain system superiority. The rapid changes to the weapon systems and the operational requirements to make changes and support the new systems in the field severely tax the capabilities of traditional depot, intermediate, or organizational level Test Program Set (TPS) support assets for SOF. Research and development of new technology is required to leverage or enhance the TPS development capabilities of traditional standard test sets to meet the SOF needs for rapid TPS maintenance.

1.2 OBJECTIVE

The objective of the effort is to support the government in implementing a Rapid Avionics Test Modification Capability. These tasks are required to support avionics platform Program Managers (PM) with unique frequently changing avionics testing requirements.

2. WORK PERFORMED

2.1 AN/ALQ-184 ELECTRONIC COUNTERMEASURES (ECM) POD CABLE TEST

Purpose — The Technical Information Memorandum (TIM) documented the development effort, development environment, and tool used to create the ALQ-184 electronic countermeasures (ECM) pod phase matched cable test capability for WR-ALC. This TIM describes the test interfaces and the interactions required by the test operator to perform calibration and test activities. These include: references to the power-up and power-down procedures for the host test station, pre-test calibration activities, calibration validation procedures, cable testing by selected part number, and printing and storing of cable test results. See Appendix A for further information about this TIM.

2.2 RADIO FREQUENCY MOBILE ELECTRONIC TEST SET (RFMETS)/DOWN SIZE TESTER (DST) COST/BENEFIT ANALYSIS (CBA) AUTOMATIC TEST STATION COMPARISON STUDY

Purpose — The CBA was designed to aid in determining if United States Special Operations Command (USSOCOM) should continue to use the Radio Frequency Mobile Electronic Test Set (RFMETS) as the common deployable intermediate level avionics tester or if the proposed F-15 Down Sized Tester (DST) should replace the RFMETS.

Scope — The study was limited to a CBA of the RFMETS and the DST because these were the only candidate test systems that could meet Special Operations Forces (SOF) requirements.

Introduction — The study compared the use of the DST and the RFMETS in fulfilling the Air Force Special Operations Command (AFSOC) intermediate level avionics maintenance requirements. To assure that the CBA remained unbiased, actual data was used when available. Assumptions and statements of fact were reviewed and agreed to prior to the analysis. The measures of effectiveness included DoD acquisition, operation and support costs, ability to meet AFSOC workload demands, test system availability schedules, and SOF deployability needs. The most representative common set of units under test (UUTs) was selected from among existing avionics subsystems that both test sets were supporting or that they have been designed to

support. Actual information for each of the subsystems was used where available. An agreed upon model and factors were used to consolidate measures of effectiveness for each of the testers when actual information did not exist.

Methodology

Requirement Definition — During this phase, the comparison groundrules and assumptions were established. The objective was to conduct an unbiased comparison of the RFMETS and the DST by evaluating each of the test systems ability to test a common selection of LRUs. A common or derivative avionics subsystem that both test systems had been designed to support is the common LRUs of the APG-70 and APQ-180 radars. These radar subsystems offered an opportunity to exercise a large portion of the capabilities of each of the test systems using common test requirements. The DST is designed to support the APG-70 radar subsystem and the RFMETS supports the APQ-180 radar subsystem. Since the APQ-180 radar is used on the AC-130U aircraft and is a derivative of the APG-70 radar used on the F-15 weapon system, there are similarities in test requirements. Differences in test requirements between the two radar subsystems were noted and the impact of the differences highlighted. Using a single major subsystem as the basis of comparison was expected to yield a cost-effective result in a realistic timeframe. Other avionics subsystems that may have test requirements in common between the test systems were considered for incorporation in the comparison. A listing of all subsystems supported by each test system was provided to show the range and variety of the avionics subsystems supported.

Data Gathering — Data for each of the test systems was gathered to satisfy the comparison requirements. The complete list of avionics LRUs tested by each of the testers was collected for comparison (atch.1). The operational/deployment impact of each of the test systems was determined. The comparison of the selected LRU Test Program Sets (TPSs) was done in detail and included the setup and run time requirements, transportation and deployment footprint, size and weight, recurring and non-recurring cost and schedules, deployed operational requirements, and the test coverage for each of the LRUs.

Data Evaluation — The data collected for each test system was provided as information to the USSOCOM, AFSOC, San Antonio Air Logistic Center, DST and RFMETS Program

Offices. The DST and RFMETS data was validated by the DST and RFMETS Program Offices respectively to assure that it was complete and would contribute to an unbiased comparison.

Analysis — Actual data for each test system was used in the analysis. Differences in the data were evaluated and modeling was used where no actual data was available. The operation and support costs were evaluated using the Joint Advanced Strike Technology (JAST) Operating and Support Technology Evaluation (JOSTE) model. JOSTE is the latest evolution of the TASC family of LCC models that use the same computation algorithms as life cycle cost analyzer (LCCA) and standardization evaluation program (STEP). JOSTE was proposed for use in this study because it offers a flexible means of evaluating alternatives for life cycle cost impacts using a readily available personal computer (PC) environment. The JOSTE model is a Microsoft Windows hosted, PC based operating and supports cost and technology assessment program.

Study Recommendation — The analysis/study findings showed that the most cost effective test system to support the continued and new SOF requirements was the RFMETS based on the JOSTE model analysis. The rehost/development costs of TPSs to a new tester was cost prohibitive and the support structure in place could easily be expanded versus establishing a new support structure.

2.3 CV-22 SUPPORTABILITY STUDY

Purpose — The purpose of this study was to understand and analyze the common and unique maintenance requirements of the V-22, CV-22, and the MV-22 weapon systems. Particular emphasis was placed on understanding the needs and requirements of the Special Operations Forces (SOF) as the CV-22 weapon system is deployed.

Scope — The V-22 development program is managed by the Naval Air Systems Command at Crystal City, while the SOF peculiar equipment is funded by the Air Force through the Air Force Special Operations Command (AFSOC), Hurlburt Field, Florida. The study included the available CV-22 avionics suite information in a database used to develop input files for alternative cost analysis using the JAST Operating and Support Technology Model (JOSTE), a Life Cycle Cost (LCC) model developed by TASC for the Joint Advanced Strike Technology Program.

Methodology — The study began with a review of the available documentation describing the requirements for the V-22 weapon system and the specific requirements for the CV-22 weapon system built to comply with the needs of the SOF community. Discussions were held with Program Office personnel at Crystal City to gain a clearer understanding of the avionics requirements described in the Operational Requirements Document for the weapon system. An information-gathering trip was made to Hurlburt Field, Florida to gain further insight into the avionics needs in the SOF environment. The avionics subsystem descriptions were compiled in a database used for entry into the JOSTE Model. The information was then used for what-if analyses of alternative support techniques and avionics configurations.

Study Assumptions/Guidelines — The Engineering, Manufacturing, and Development (EMD) phase of the V-22 is funded by the Navy, while production funding of the common MV-22 features will be assumed by the Air Force and funding for the unique hardware in the CV-22 will be assumed by the US Special Operations Command (USSOCOM).

Analysis Concept — JOSTE has been employed in this study because it offers a flexible means of evaluating alternatives for life cycle cost impacts using a readily available personal computer (PC) environment. The JOSTE model is a Microsoft Windows hosted, PC based operating and supports cost and technology assessment program. It was developed to evaluate the combined cost of acquiring and supporting next generation avionics systems. It assesses the costs associated with the supportability and sustainability of systems over their operational life. Cost comparisons can facilitate selection of avionics alternatives at the system and the subsystem levels. The model will also support technology cost forecasting using technology maturity levels and technology scaling factors. Since avionics alternative evaluations will be needed over an on-going basis in the future, the data was structured to permit the analyst to rapidly re-configure the model to run the analysis. The data has been compiled and maintained in a FileMaker Pro database designed to be readily expanded as data becomes available or changes as the program matures.

Study Recommendation — The study showed that the CV-22 aircraft possessed systems that could be supported with the METS/RFMETS automatic test stations. Existing TPSs could be

modified to provide the additional repair capability for common systems, while new TPSs would have to be developed for CV-22 SOF unique systems.

2.4 CALIBRATION AND MEASUREMENT REQUIREMENTS SUMMARY STUDY

Background — The Calibration and Measurement Requirements Summary (CMRS) is a three-category, contractor prepared summary of measurement parameters. The CMRS identifies all measurement requirements within a specific system or item of equipment (including Support equipment (SE) items) which must be measured or tested to ensure the system's operation is maintained within its specified limits. The CMRS further indicates the contractors proposed solutions to maintain the system parameters within stated limits. These data are provided to the Air Force, ensuring calibration supportability and planning.

The CMRS is made a contract deliverable by referencing the required language in the contract. Calibration is a necessary element of logistics support for Air Force weapon systems, subsystems, and Support Equipment (SE). For adequate calibration support to be available at the time and place it is needed, it must be considered early in the Acquisition process. Measurement parameters of new systems and equipment can generate requirements for Air Force or national standards. Developing such standards and the means to transfer their value can be a lengthy and costly process.

Acquisition agencies are required to ensure calibration support is considered during the planning for logistics support of their equipment. Most test measurement and diagnostic equipment (TMDE) acquired in support of new systems or subsystems is identified by the contractor through Logistics Support Analysis and CMRS. Because of a lack of funding or oversight during system acquisition, CMRSs are not always developed and/or provided.

Purpose — TASC was asked to investigate/study the possibility of developing software that could be used to develop a CMRS product after a system had already been acquired or to find out if software already existed. TASC approach was first to determine if there were any commercially available tools that would expedite data extract for expediting the manpower intensive task of manually extracting the TYPE I CMRS data and the components needed to develop the TYPE 3 data. TASC and the project officer reviewed two potential tools. The first

was a modified version of Galactic's Test Program Set (TPS) Instrument Command Extraction Tool (TICET). The tool was able to automatically extract absolute values but not tolerance data. Galactic's estimate for modifying their tool to extract variable data was not cost effective for this effort. The second tool reviewed was a GTT's (General Telephone & Telegraph) tool. Their design was sound but it was neither cost nor time effective for this effort. In both cases, neither product could be used to meet the Air Force requirements without major investment of time and money. A total development effort was also found not to be cost effective, compared to original cost estimates provided by the system developers. Another option that was looked at was extracting the data from electronic files using a database and associated software which could be developed within the cost and time constraints of this study. The program office provided all available files to TASC for review and started development of the database prototype. This process included a three-week effort to determine what portions of the effort could be hosted in MS Access database and what portions could not. The design and building of the database prototypes for this effort were completed. Review of the available MS Access functions revealed that it would be more cost effective to use MS Basic program because of the repetitive, multiple database queries, extraction, and mathematical operations required. During an interim briefing, government personnel directed that no further effort should be expended on the investigation/study, as no possible alternatives would be cost effective. In addition, much of the data required for generation of a CMRS was proprietary or not purchased during the acquisition phase of the program.

2.5 AIRCRAFT MODERNIZATION PROGRAM (AMP)/COMMON AVIONICS ARCHITECTURE FOR PENETRATION (CAAP) ACQUISITION STRATEGY

Introduction — This tasking was concerned with defining a roadmap of activities that were required in order to arrive at a Milestone I decision for CAAP. Other tasking covered an independent assessment of the CAAP Acquisition Strategy. As a result of activities occurring at high levels in the Air Force and DoD the possibility of the Avionics Modernization Program (AMP) and CAAP being conducted together and at Wright-Patterson AFB surfaced. New tasking provided by ASC/LUN consisted of assessing the effort already being done on AMP and the acquisition strategy to be pursued by the AMP/CAAP combination. A particular activity covered during the tasking consisted of reviewing the CAAP Conceptual Design developed by

ASC/LUN. The Integrated Weapon System Support Program (IWSSP) contract awarded by ASC/LU was made to the Boeing Company with a support approach to build on the successful ongoing AC-130U Interim Contractor Support (ICS) organization by adding team members from industry and government. The industry team mates include: TRW, Manufacturing Technologies Inc., Ball Aerospace, MacAuley Brown, California Microwave Inc., Systems & Electronics, Inc., and Crestview Aerospace Corporation. Also, a business understanding has been signed with Warner Robins Air Logistics Center that provides Boeing-Air Force software systematic development (LY), C-130 core competencies partnering (LB), and defensive avionics integration support (LN). The understanding with WR-ALC also provides for cooperative usage of the Air Force Special Operations Forces Extendable Integrated Support Environment (EISE) facility at WR-ALC and the Boeing Software Integration Laboratory (SIL) at Fort Walton Beach, Florida. This contract will be used to support all SOF sustainment requirements.

Assessment of CAAP Acquisition Strategy — A roadmap of the activities defining an Acquisition Strategy for the CAAP program was under development during the time of this tasking. Due to the activities of higher authorities, discussed above, the CAAP acquisition was never completed. As a result of this effort, some useful ideas were developed which are discussed in subsequent sub-paragraphs.

Conceptual Design — A draft copy of the CAAP Conceptual Design developed by ASC/LUN team was reviewed during this period. The design was not reviewed in detail but several observations were noted. Overall the effort appears to be a sound technical treatment of integration of CAAP on SOF aircraft. There were portions that were not complete at the time of its review.

The material on the C-130U was incomplete and needs further effort. It was interesting to note that the C-130U does not consider the integration of the Low Probability of Intercept TF/TA. This was because the USSOCOM ORD does not list the TF/TA as a threshold requirement, only as an objective requirement for the C-130U. It would seem that this should be a threshold requirement on all SOF aircraft. It is suggested that this be considered in follow-on activities.

During this design investigation, the replacement of the AP-102A was not investigated. This processor has marginal growth capability and will become a key factor in any integration of AMP/CAAP capability on SOF aircraft. The most challenging replacement of the AP-102A will be on the AC-130U. This replacement leads to the question of how do you develop software to work on the new processor(s) and maintain all the current capability? The use of an Open System Architecture has been proposed but it is not clear from material reviewed as what programs have any experience in this area. The concept seems worthy of pursuit but this area needs to be considered high risk.

The CAAP Conceptual Design needs to be continued with the goal of developing a set of well-defined requirements, which can be used in either a combined AMP/CAAP program or a CAAP program alone. The surest and quickest way to create problems in any program is to start with poorly defined requirements and continue to make changes in requirements during development. ASC/LUN has a plan for the follow on effort and this should be pursued with the intent of establishing well defined requirements, replacement of the AP-102A, and identification of all interfaces with the AMP program. In addition, a through Risk Management analysis needs to be applied to this task.

Handbook Development — Using the material contained in the Defense Acquisition Deskbook (DAD) Version 2.4, a handbook for Risk Management and Acquisition Strategy were developed. These handbooks contain information from the DAD containing topical descriptions, procedures, mandatory and discretionary references, applicable training courses and discretionary practices in DoD and the Air Force. Each handbook has a table of contents indicating the topics covered in each section. In addition to the Risk Management and Acquisition Strategy volume, there is a volume, which contains DoDD 5000.1, and DoDD 5000.2-R. A large amount of the regulatory requirements pertaining to the acquisition process is contained in these two DoD Directives.

To indicate how the handbook can be used, an example follows. In the Table of Contents of Part I of the "ACQUISITION STRATEGY" volume under Tab 1 can be found the topic "Process Information." The following information is found under this tab: An outline, which establishes a general model for managing a Major Defense Acquisition Program (MDAP); a

listing of recommended Program Management Courses; Mandatory references dealing with the acquisition process, discretionary references, which can be accessed from the computer exactly just like the mandatory references; and a discussion of the "General Acquisition Process."

The reason that the "Process Information" topic was selected as an example was to point out information contained in the article "General Acquisition Process." In this article, a table titled "Program Documentation for Milestone Reviews" lists the mandatory documentation required at each milestone review, source of the requirements (Statutory or Regulatory), who prepares the document, who approves/considers the document, and if the document has a mandatory format. This table is invaluable in the preparation of any acquisition strategy program and its required documentation.

Efforts are underway to see that all ASC/LUN personnel have accessed to the latest version of the DAD through their computers. If this is successful, then the information contained in the handbooks can be access directly through the computer and displayed on the monitor. Members of ASC/LUN will have the option to find information either by reading the handbook or viewing the material on the monitor.

Training — ASC/SYG PreAward Support Office (PASO) is an office at Wright-Patterson, with a multi-functional team of government and contractor personnel, dedicated to assisting ASC acquisition teams through the preaward process (Acquisition Strategy, Request for Proposal (RFP) Development and Source Selection). Training is offered by the PASO and it is tailored to the specific needs of each program team. The Acquisition Strategy Process Training consists of courses such as; An Overview of the Preaward Process, Statement of Objectives (SOO) Overview, Acquisition Strategy Planning Process, Test and Evaluation in the Preaward Process, Source Selection Planning Overview, and Cost as an Independent Variable (CAIV). In addition, they offer Competitive Program Workshops and Request for Proposal Training. One of the more important Workshops is the Initial Program Risk Assessment Workshop. The documents developed during this workshop are the Initial Draft Statement of Objectives, Evaluation Criteria Outline, and Instructions to Offerors, Outline and Program Risk Matrix. A course syllabus is located in the "ACQUISITION STRATEGY" Part II handbook.

Contact with the PASO office needs to occur as soon as the AMP/CAAP programs are assigned to ASC and the Working Level Integrated Product Team (WIPT) has been selected. The WIPT should be scheduled for all the Acquisition Strategy Process Training, Competitive Program Workshops, and Request for Proposal Training. The training should start as early as possible so that it is not delayed by the magnitude of the workload limiting the availability of team members. Contacts in the PASO office are Lt. Col. Kevin Rankin (937) 255-2763 and Mr. Robert Andrews (937) 255-2763. Mr. Andrews is the ASC/LU point of contact in PASO.

The PASO has developed a generic schedule program for both competitive and sole source procurements. These schedules run on Microsoft Project 4.0 and can be used, as a model by the acquisition team, in planning the activity needed to get to a given Milestone. The team can add or delete activities and change the amount of time to accomplish an activity based on the characteristic of the particular program. All the statutory and regulatory activities are included in the generic schedule. The program should be aware that the PASO is required at ASC to approve the RFP before it can be released to industry.

2.6 PROGRAM SUPPORT

Primary program support was provided to the Integration Program Office ASC/LUN in support to the following programs: Mobile Electronic Test Set (METS) and Radio Frequency Mobile Electronic Test Set (RFMETS) intermediate/depot level tester acquisition and modification programs, along with the acquisition of three additional RF sections. The Aircraft Radar Avionics Test Station (ARATS) intermediate level tester acquisition, Test Program Set (TPS) development involving several developers (Lockheed Martin Federal Systems, Systems and Electronics, Inc., TAMSCO, and DME Corp.). In addition, the AP-102A Mission Computer Depot repairs acquisition, MC-130H aircraft APQ-170 radar modification to the -423E/425 configurations, and the APQ-170 radar depot repair acquisition.

The intermediate level maintenance capability is comprised of the ARATS APQ-170 radar hot mock-up, METS and RFMETS test sets, Test Program Sets (consisting of Test Programs, Interface Test Adapters, and engineering/technical data) for selected groups of LRUs, ancillary equipment to augment test set capabilities, and engineering/technical data. The Intermediate-level (I-level) capability detects failures of the LRUs, isolates them to failed Shop

Replaceable Units (SRU), removes and replaces the failed SRU, and certifies the operational suitability of the LRU. The I-level capability supports LRUs from the AC-130U Gunship All Light Level Television (ALLTV), APQ-180 radar, displays, weapons control systems, and AIC-40 communications system; AC-130H, AIC-38 communications, displays, and weapons control systems; and the MC-130H APQ-170 radar system. The I-level capability is a mobile and, except for the ARTS, deployable on two pallets on support aircraft. While deployed, it operates in a double-wide NAVAIR shelter.

The Depot-level capability consists of TPSs, ancillary equipment, tools, and engineering/technical data for use with several existing depot test sets at WR-ALC along with software maintenance capabilities. The depot capability maintains selected SRUs and some LRUs that cannot be repaired in the field. The depot includes a set of the I-level capabilities. The depot capability detects failures in SRUs, isolates the failed components, removes and replaces the failed components, and certifies operational suitability of the SRU. The depot supports the majority of the systems identified at the I-level. The Automatic Test Equipment will be managed by SA-ALC and the aircraft UUTs will be managed by WR-ALC.

One of the major development effects accomplished for support to ASC/LUN was the identification of all LRUs and SRUs being supported by the METS/RFMETS testers. This was accomplished by developing and maintaining a database that tracked all required information and part number rolls. This Excel spreadsheet example (Attachment 1) was developed/maintained by TASC and used by the MAJCOM, Program Offices, and supporting Air Logistics Centers to insure total subsystem support. In addition, a scheduling notebook (Attachment 2) was developed/maintained showing all the subsystems being supported, Government Furnished Equipment requirements, status, and location. The notebook also included schedules for each system being supported, funding information, listing of key personnel and other information required for successful completion of the program. This notebook became a value asset and key management tool for the program and over 80 individuals on distribution. TASC performed trade-off analysis, schedule analysis, and recommendations on contractor submitted schedules and prepared briefings as required.

Another area that was constantly under evaluation was that of rehosting the METS/RFMETS TPSs to other candidate automatic test stations. In fact, a separate study was conducted against the F-15 Down Size Tester as explained earlier in this report. In all cases, the rehosting of TPSs was too costly, as no software existed that would allow the conversion in a cost-effective manner, thus requiring full TPS development.

These are only some of the major areas that were supported by TASC during the period covered by this contract. This report can not be totally inclusive but provides the most important areas of study or support to ASC/LU.

3. CONCLUSION

During the period of this delivery order, many of the specific tasks and the extent of the support required was to implement a capability to baseline the many different development programs required to support the Special Operation Forces intermediate and depot level avionics testing requirements. Once this was accomplished, much of the effort was concentrated on supporting studies as outlined in the Statement of Work (SOW) paragraphs 3.1.1 through 3.1.4 and direct program management support.

The studies and support provided by this delivery order allowed ASC/LUN to accomplish the critical tasks necessary to support their customer in a timely and cost efficient manner. TASC helped solve many of the day-to-day and long-term problems facing ACS/LUN by recommending alternative solutions; identifying potential problem areas while providing recommended solutions, providing experience in program management, operations, and support cost benefit analysis; and providing comparison studies.

APPENDIX A
TECHNICAL INFORMATION MEMORANDUM

**Technical
Information
Memorandum**

Litton
TASC

<p><i>To:</i></p> <p>Commander Warner Robins Air Logistics Center Robins AFB, GA 31098</p> <p>Attention: Mr. Mark Leslein</p>	<p><i>TIM No.</i></p> <hr/> <p><i>Date:</i> June 1998</p> <hr/> <p><i>Contract No.</i> F33615 -92-D- 1052</p> <hr/> <p><i>From:</i> Michael H. Nichols</p>
<p><i>Program:</i></p> <p>Rapid Avionics Test Modification Capability (RATEMC)</p>	<p><i>Approval:</i> C.J. Debeljak</p>
<p><i>Subject:</i></p> <p>AN/ALQ-184 ELECTRONIC COUNTERMEASURES (ECM) POD CABLE TEST</p>	

ABSTRACT

This Technical Information Memorandum (TIM) documents the development effort, development environment, and tools used to create the ALQ-184 electronic countermeasures (ECM) pod phase matched cable test capability for WR-ALC/LNXEJ. This capability was developed under the Rapid Avionics Test Modification Capability (RATEMC) deliver order of the Avionics Software Technology Support (ASTS) contract (F33615-92-D-1052) with Wright Laboratories Hardware and Software division. Additionally, this TIM describes the test interfaces and the interactions required by the test operator to perform calibration and test activities. These include: references to the power-up and power-down procedures for the host test station, pre-test calibration activities, calibration validation procedure, cable testing by selected part number, and printing and storing of cable test results.

Table of Contents

<u>Section</u>	<u>Page No.</u>
1. Background.....	A-4
2. Scope	A-5
3. Design and Development of Cable Tests.....	A-6
3.1. Software Reconfiguration.....	A-6
3.2. TPS File Development From System Specifications.....	A-14
3.3. Developing a TPS Using the MiCATS TM Development Environment	A-16
4. ALQ-184 Cable Test Reports.	A-20
5. Conclusion	A-21
6. ALQ-184 Cable Test Results.....	A-22

1. BACKGROUND

The modification of test specifications or the addition of new test requirements into an existing automated test system (ATS) requires a software development effort that is time consuming and expensive. TASC developed re-configurable software during the Traveling Wave Tube (TWT) Automated Test Station (TATS II) Version II development program for WR-ALC/LN. This software suite, the Microwave Component Analysis and Test Software (MiCATSTM), includes several tools that enable rapid modification of the software and the data files used to define the operation of the software. Combined with a robust set of test editors, MiCATSTM enables the software maintainer to rapidly prototype new test and measurement capabilities. Utilizing generalized test algorithms as templates for developing new tests or the editors to modify or create new test requirements, WR-ALC/LN selected the MiCATSTM as the development system of choice to acquire a test capability for the ALQ-184 ECM Pod phased-matched cables.

2. SCOPE

WR-ALC/LN needed the ALQ-184 ECM pod phased-matched cable test capability developed rapidly to meet program milestones and desired a cost-effective solution that would also provide growth for future requirements. This test capability included Voltage Standing Wave Ratio (VSWR) testing, insertion loss testing, electrical length or phase testing, and the ability to track phase for sets of cables. TASC was to develop this capability within 30 to 60 days and be able to test several different cable lengths, each with its own VSWR, phase, and insertion loss requirements. Utilizing the MiCATS™ test develop suite, TASC would build prototype tests to meet these requirements by modifying exiting tests and using the editors to create the various test limits files for the cable specifications.

3. DESIGN AND DEVELOPMENT OF CABLE TESTS

Using specification data provided by WR-ALC/LN in the Times Microwave Systems Acceptance Test Plan (ATP) for cable assemblies, manufactured by Times Microwave Systems per Raytheon drawing 1038372 and 1038373, dated 29 March 1996, TASC developed the required tests and associated test limit files using the MiCATSTM development suite. The development effort spanned five weeks and this included software re-configuration, calibration procedures development, test limit files creation, verification and validation, integration testing, sell off to the WR-ALC/LN customer, test of approximately 100 cables, and development of cable test procedures and reports. The process for developing Test Program Sets (TPSs) for the various cables, four different cable types, is delineated in the following paragraphs.

3.1 Software Reconfiguration

While the MiCATSTM development suite included several of the test programs required to support this effort, the VSWR and phase matching programs had to be developed. By utilizing software components within the MiCATSTM development library, TASC was able to prototype these new programs within two weeks. Once they were developed, associated test editors were fabricated using legacy components within the MiCATSTM software assets library. Once the basic programs and editors were developed, the MiCATSTM editing environment was used extensively to create specific TPSs for the various cables. The cable testing required that we have the ability to perform phase, VSWR, and insertion loss testing. To maximize the utility of the test programs and minimize the impact on the TATS II, TASC hosted the entire set of cable tests on the Vector Network Analyzer, which is currently used to test ALQ-184 TWT phase only. Therefore, we gained more utility from this instrument and allowed testing to be conducted on the VNA without interfering with other testing activities, if desired. The four primary tests are discussed in the following paragraphs.

The Voltage Standing Wave Ratio (VSWR) Test performs a forward and reverse measurement of reflected input signal and compares the measured amount to the maximum allowable amount for each cable. Refer to Figure 3-1 for discussions concerning the operation of the VSWR Test.

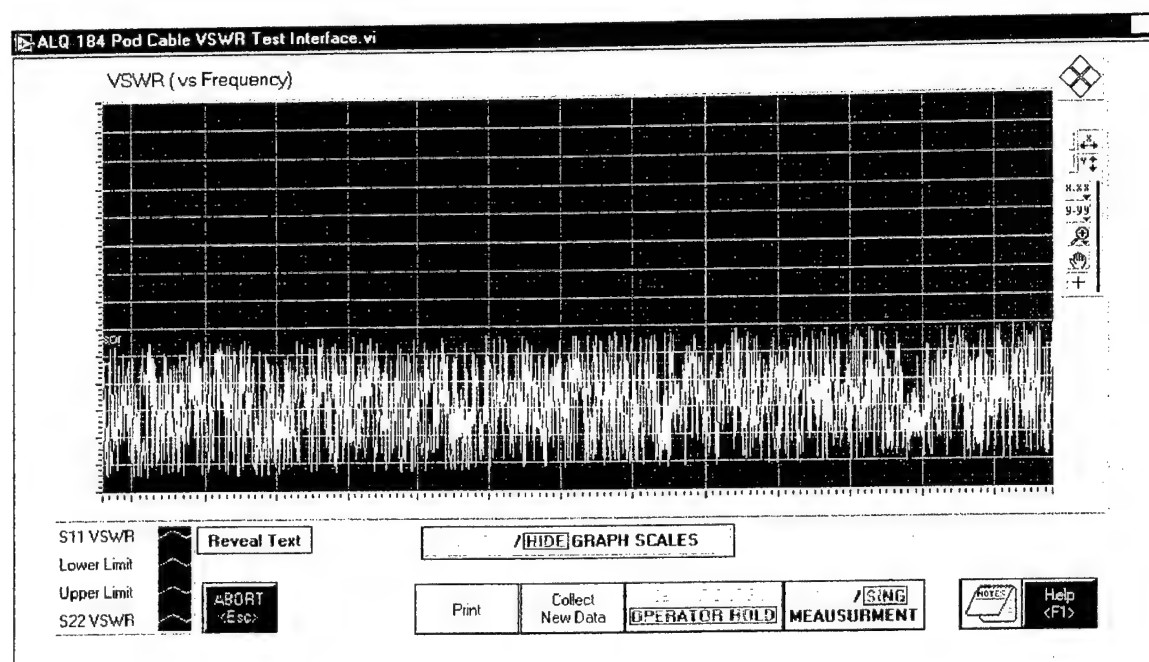


Figure 3-1 VSWR Test Interface

The VSWR Interface Panel has a large graph that depicts the measured forward and reverse VSWR for the cable under test (CUT). The yellow plot represents forward VSWR and the purple plot represents reverse VSWR. The VSWR Interface Panel has several user controls located on it. Since many of these controls are standardized, they will be labeled and function exactly the same on other interface panels. For this reason, they will be discussed once in this section and not repeated in other sections. To the top right side of the graph are the graph controls. These controls are used to manipulate the graph display and include: X and Y manual and auto scale controls, magnifying glass, pointer, and paging (+) capability. The graph legend in the lower left corner provides a color-coded display of the various plots used on the VSWR Graph. Across the bottom of the interface panel are the

test interface operator options. The first is the ABORT option, which activates the global test abort. If in a driven sequence the next test in the sequence will automatically execute. The SHOW/HIDE GRAPH SCALES option allows the operator turn on and off the graph scales for the currently displayed graph. This option is useful if the values for the test are classified. The REVEAL/HIDE TEXT option allows the operator to toggle between a graphical display or a textual-based test report. The PRINT option allows the operator to send the graph of the test results to the default system printer. The COLLECT NEW DATA option allows the operator to force the test to collect new test data. The TEST PROCEED/OPERATOR HOLD option allows the operator to toggle between automatic test proceed after collecting and displaying results or operator hold mode which allows the operator to interact with the test interface panel. The CONT/SING MEASUREMENT option allows the operator to set the test to collect a single set of data (default) or continuously collect and display new data. The NOTES option allows the operator to launch the interactive NOTE TOOL for entering data into test specific, test sequence peculiar, or personal files. The HELP option allows the operator to enable/disable the on-line help capability that explains the various controls and indicators located on the test interface panel. All of these controls are standard controls that appear throughout the interfaces within the ALQ-184 Cable Test software.

The Phase Test measures the electrical length of the CUT and compares it to the expected electrical length and displays the results in phase relative to the desired length. The Phase Test uses the actual electrical length of the individual cables to test each of the cables. Since the electrical length difference desired between the CUT and the electrical length standard is zero, the tolerance is applied around a zero level. Therefore, an upper and lower maximum allowable phase is displayed as solid red lines at the minimum and maximum levels. Reference the Phase Test interface panel during discussions that follow. The graph displays the measured phase value referenced to zero or the desired electrical length. The graph controls are standard and control the display as described in the VSWR Test.

In Figure 3-2, the user controls on the Phase Test Interface Panel are the same as the VSWR test.

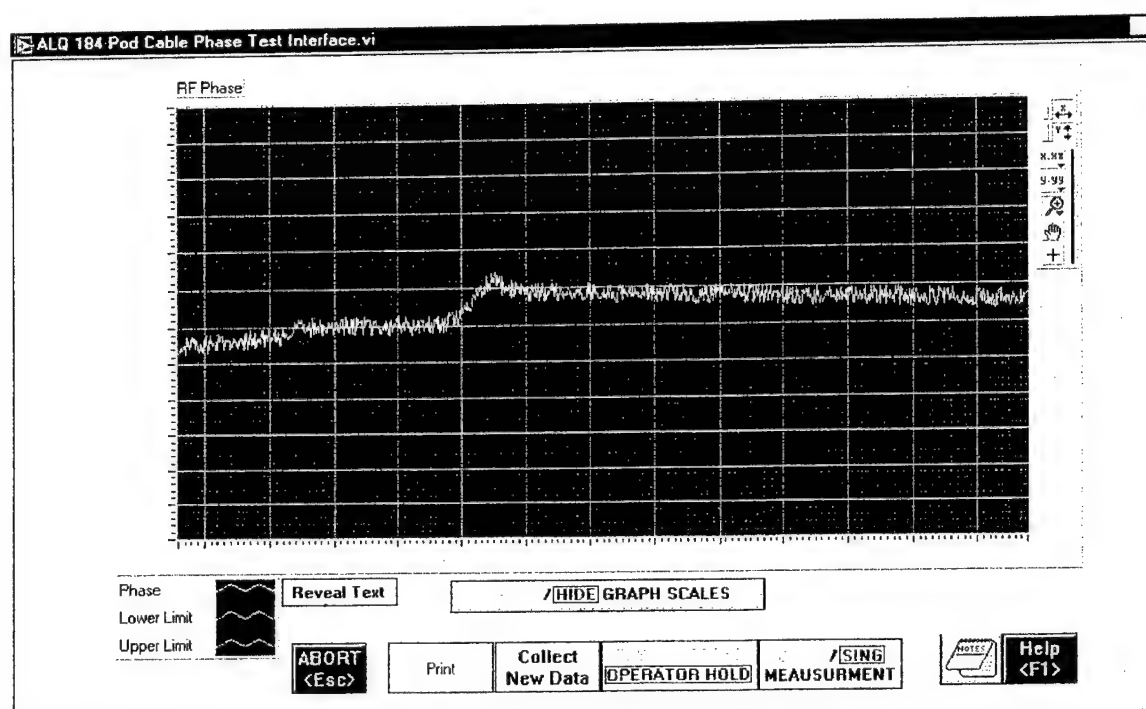


Figure 3-2 Phase Test Interface Panel

The Insertion Loss Test is designed to measure the loss of the CUT over the designated frequency range and compare it to the maximum allowable loss for the cable. Since the cable loss is only a maximum amount of negative loss, the test displays only one parameter line, which represent the maximum loss at each of the corresponding frequency within the applicable frequency band. The Insertion Loss Test takes a reading of the path loss with no CUT installed during the calibration and then takes an identical reading with the CUT installed and determines the loss associated with only the CUT. The Insertion Loss Test Interface Panel is displayed in Figure 3-3. The controls are the same as for the VSWR Test Interface Panel.

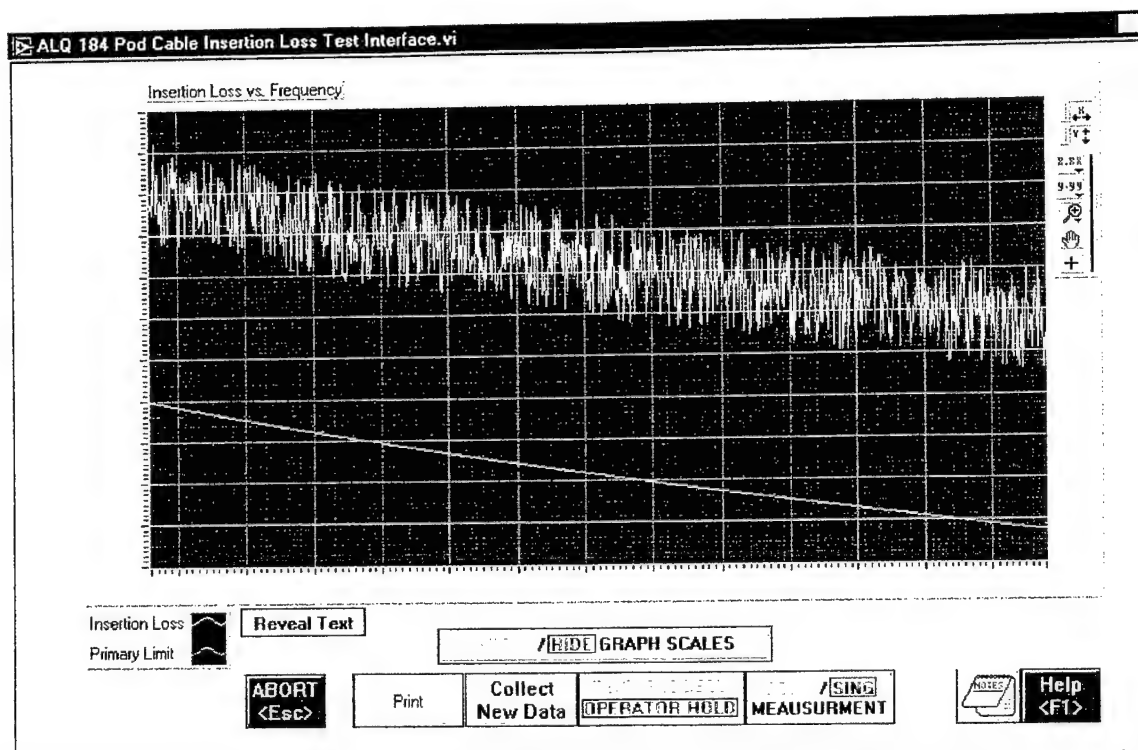


Figure 3-3 Insertion Loss Test Interface Panel

The ALQ-184 Cable Test Post Run Interface Panel represents a collection of all three test types displayed on a single interface panel. This allows the operator and opportunity to view entire cable performance from a single interface. The three graphs represent the VSWR, Phase, and Insertion Loss plot for the current CUT. Additionally, this panel enables some higher level functions to be performed. The first is the PRINT option. The PRINT option enables a selection interface that provides the operator printing options. The operator may print all plots, the default, or select to print only those plots of choice. This panel is also used to invoke the Phase Tracking Test, which is another display option included as part of the post-run activities. The remaining options presented on the post-run interface panel are standard controls and indicators that have been discussed previously. To activate the Phase Tracking Test, select the PHASE TRACKING option on the interface panel and the Phase Tracking Interface Panel will appear. This interface panel is discussed in the following paragraphs.

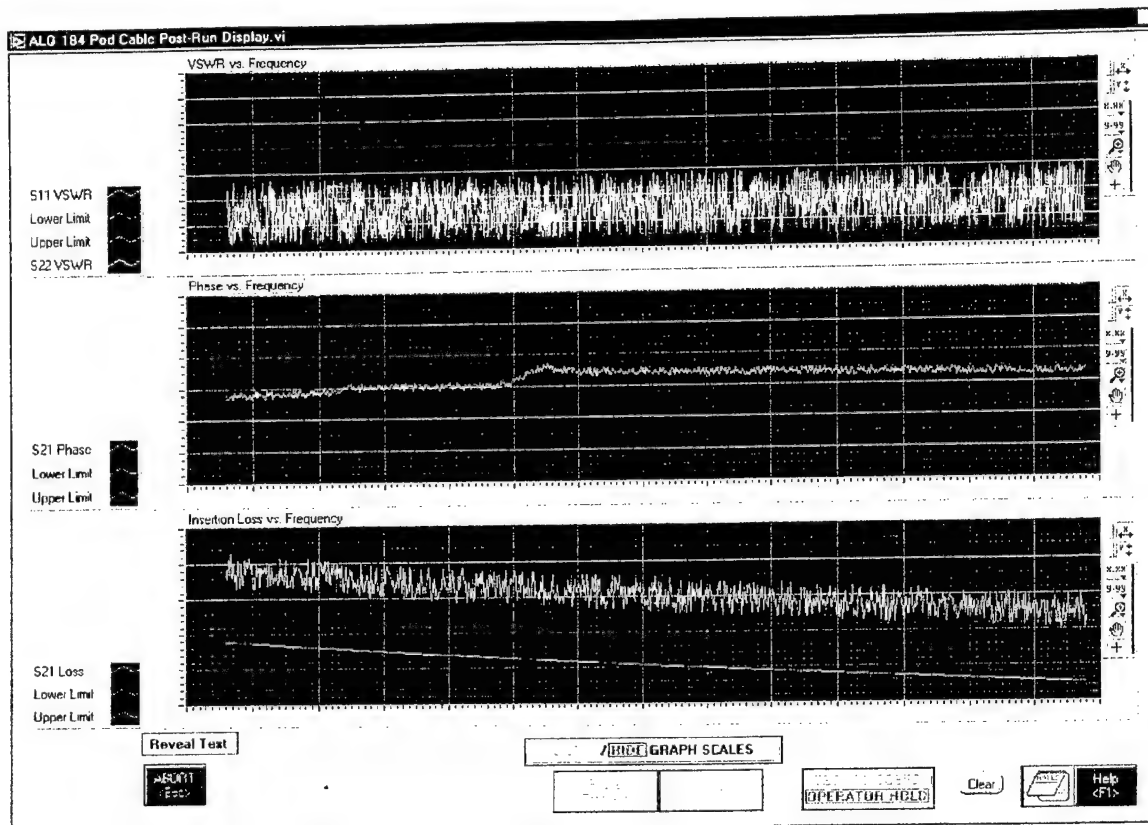


Figure 3-4 Post-Run Interface Panel

The Phase Tracking Test collects phase plots from the current group of cables. Each plot is assigned a plot number which corresponds to the order in which the plots were collected. Additionally, the maximum phase difference is displayed in the phase tracking plot at the top. The Phase Tracking Test compares the phase values of the individual cable plots at all frequencies across the desired frequency band and finds the single frequency point at which the greatest phase difference for all cable plots occurs. This is represented on the Phase Tracking Plot as a relative difference value. Since the only tolerance for the Phase Tracking Test is a not-to-exceed value, the plot displays a maximum difference limit line only. If the electrical or phase length of the cable is shorter than the desired length, this is interpreted as a negative phase value which is relatively more distant from the most positive or longest electrical length cable than all other positive length cables. Therefore, all tracking measurements are displayed as a relative phase difference, depicted as a positive value.

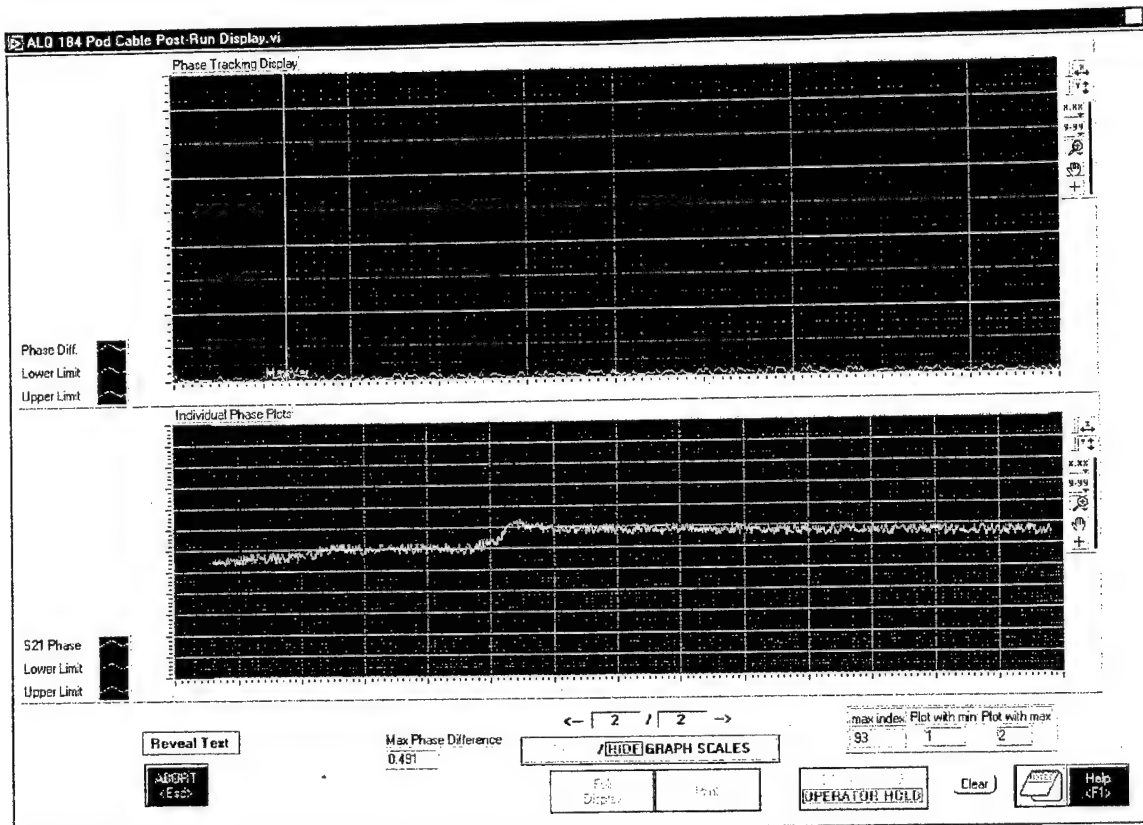


Figure 3-5 Phase Tracking Test Interface Panel

The Phase Tracking Test Interface Panel has numerous test specific user controls. The Max Phase Difference indicator displays the relative value representing the maximum phase difference of all cables current included in the Phase Tracking Test array. Above the SHOW/HIDE GRAPH SCALES option is plot selected/number of available plots indicator. The operator intuitively knows how many plots are stored within the current Phase Tracking Test array by the number of plots listed on the right. The number on the left indicates the currently displayed phase plot number. Remember this plot number is assigned by the order in which the phase plot data was collected. To sequence through the available phase plots and view the plot graphically, select the left arrow (\leftarrow) to sequence down in the array and the right arrow (\rightarrow) to sequence up. The on-panel textual display, blue text, lets the operator know when the first or last plot is reached within the Phase Tracking Test array. The box located above the TEST PROCEED/OPERATOR HOLD option contains information

pertinent to the Phase Tracking Test array. The Max Index indicator contains the number of indices within the current Phase Tracking Test array. The plot with MIN and plot with MAX values indicate the position within the array of the plots that have the greatest phase difference or those two plots currently defining the maximum and minimum for the Phase Tracking measurement. By viewing these two plots, the operator can verify the minimum and maximum phase values for the Phase Tracking Test. Finally, the CLEAR option is used to clear the plots currently stored within the Phase Tracking Test array. The operator should ensure all current phase tracking plots are saved or no longer required before selecting this option. Once this option is selected, all of the plot data for the applicable cable testing will be lost and is not recoverable.

The cable test data, including the phase tracking data, can be saved by using the applicable TEST EXECUTIVE AND RESULTS TOOL options prior to executing the CLEAR option from the Phase Tracking Test Interface Panel. To print the current cable's Test Sequence Report, select the Print option from the Test Executive Interface Panel before starting the next cable sequence. To print an entire set of cable test report, select the Results Tool option from the Test Executive Interface Panel. Then select the Print option from the Results Tool Interface Panel. To save the current Results File, select the Save option from the File window area on the Results Tool Interface Panel. Then save the file as whatever file name and file extension is desired.

To test additional cables after the cable test sequence is complete, select the TEST UUT option of the Test Executive Interface Panel. To ensure the cable is connected properly prior to executing the test, view the Vector Network Analyzer display and tighten, torque, or loosen the cable connects as required to achieve the flattest display results as near the center graticule as possible prior to executing the tests following the connection instructions. This process is repeated for each cable within the set.

To ensure the most accurate results, the input / output cables should be re-calibrated periodically. This can be accomplished between cable sets or about every two hours of test to ensure the best possible test results.

3.2 TPS File Development From System Specifications

The MiCATS™ editing environment is the heart of the RATEMC. It allows the developer to create operator instructions, device specific limit files, link these limits to generalized test programs, correlate the various files associated with the tests types, and perform validation of test parametric data using the graphical editing tools. This consists of a set of editing tools tied to the LabVIEW/ MiCATS™ Test Executive via the Test Sequence Editor. By selecting the EDIT option from the LabVIEW/MiCATS Test Executive Interface, the Test Sequence Editor is launched. Within the Test Sequence Editor is an option to edit the test VI. This option launches the various MiCATS™ Test Editors. Each test type has associated editors depending on the types of data required for the test type. For example, a Gain Test may require wide-band curve data to specify such requirements as drive level, upper gain limit, lower gain limit, operator instruction and various other test requirements. By selecting the EDIT TEST option from the LabVIEW/ MiCATS™ Test Sequence Editor, the edit options menu is presented as illustrated in Figure 3-6. By selecting the various options from the Test Edit Menu, the developer can open the test VI or the various editors associated with a particular test type.

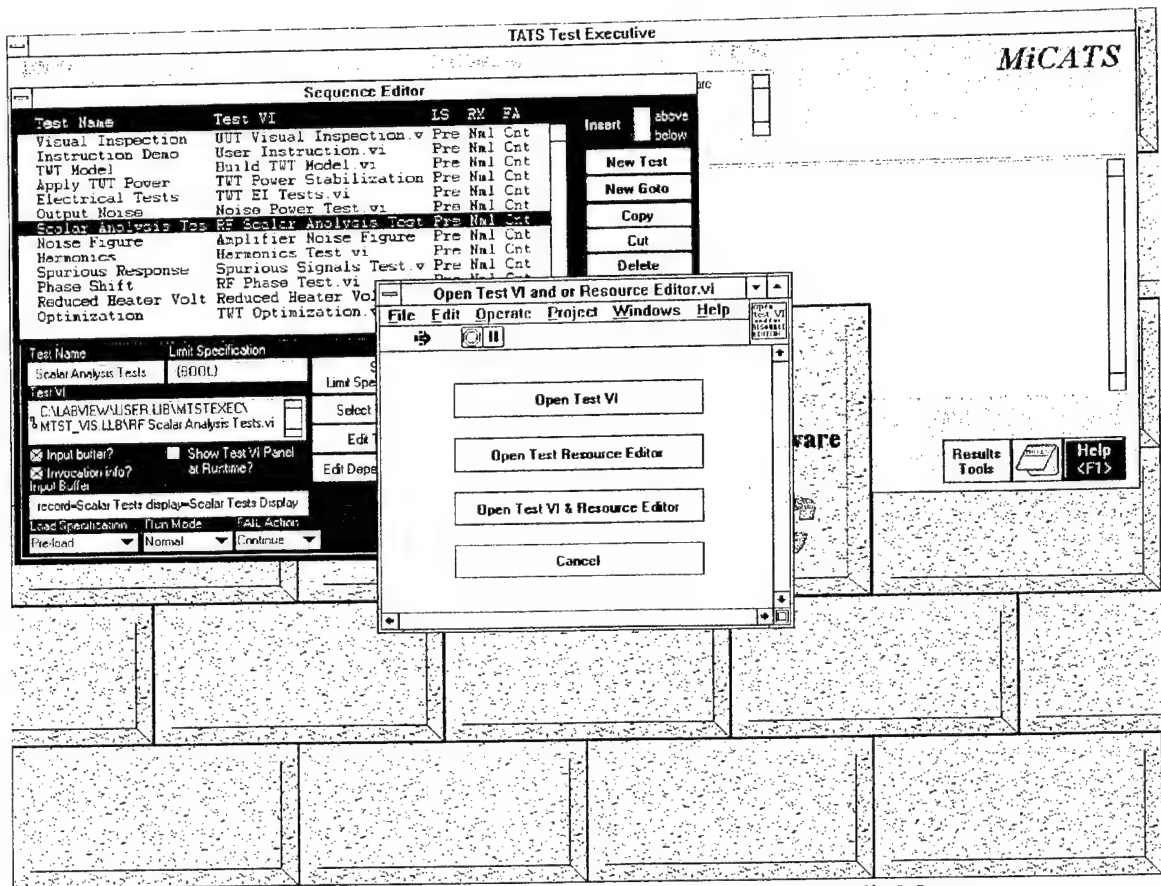


Figure 3-6 Test Sequence Editor's Test Edit Menu

After selecting the desired editing option, the individual editors will be opened allowing the software maintainer to create or edit test data. The test data editors consist of many editors that are linked to the various tests by the MiCATS™ Test Editor. This linking allows the individual tests to use numerous editors of varying types.

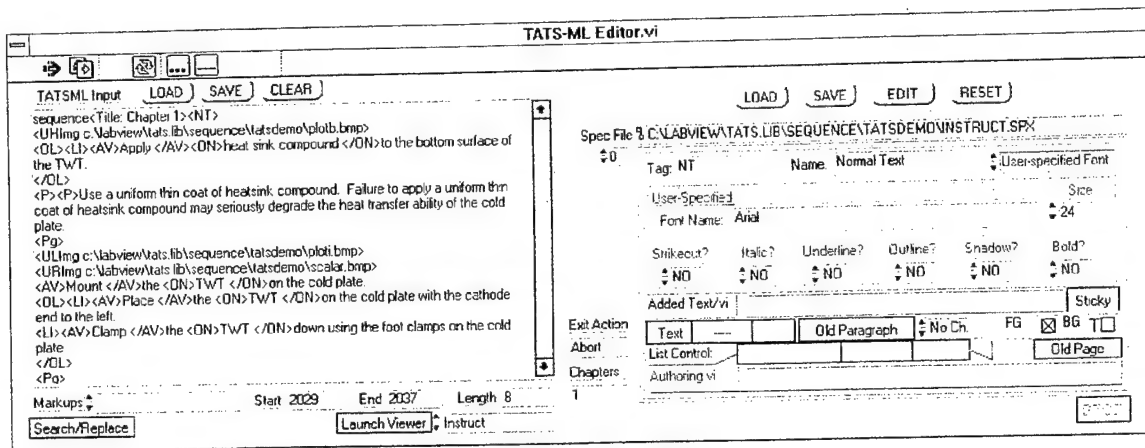


Figure 3-7 TML Editor

3.3 Developing A TPS Using The MiCATS™ Development Environment

First, the developer would use the Test Sequence Editor and the MiCATS™ Test Editor to define the tests needed within the device specific Test Sequence. Once the test sequence is developed, the required general test programs or VIs would be linked to the tests within the sequence using the Test Sequence Editor. An input buffer would be defined to indicate the location of the resource files to be used for each test within the sequence. The MiCATS™ Test Executive uses the input buffers to load the required resources during Test Executive initialization. Then, the individual test requirements identified by the user and the specific device specification would be developed using the applicable test editors.

Since the test may require the end user to perform certain set-up functions, the Textual Mark-up Language (TML) Editor would be used to develop standardized instruction sets for executing the test. Refer to Figure 3-7. The TML Editor uses standard textual input files, for example, Microsoft Word, to create test set up and execution instructions. These instructions are displayed in a standard format, using limited color coding to effectively convey operator interactions during test execution. Each unique test sequence has an associated instruction “book” file. Within the “book” files are chapters that relate to the individual tests within the sequence that use instructions. Within each chapter are pages that relate directly to instruction pages. These instruction pages contain the actual color-coded

instructions that the operator will view and pointers to any graphics that may be required to convey complex or highly interactive test set-ups. The graphics displays are presented as either upper half, upper right, or upper left bitmap images. The desired TML specification is loaded into the TML Editor from previously created files, allowing the developer to use unique mark-up specifications depending on user specific requirements. Once the TML files and the bitmap inks are embedded, the sequence specific TML file is saved in the desired sequence directory structure.

The remaining data within a Test Program Set (TPS) will consist of all the files required for the MiCATSTM test sequence to perform the desired test functions. Device specific specifications are used to create the various test limits files for the required tests. For example, a gain test would require input and output specification files to define the limits to which a generic Gain Test would perform within the required TPS. This can consist of many different requirements depending on the device to be tested, the device test requirements, and the user's test requirements. Therefore, a general description of gain test requirements are presented to provide an idea of the complexity of the interaction of the various components that are used to construct a gain test for a specific device. The Gain Test Editor would be launched from the Sequence Editor's Test Edit menu. Figure 3-8 shows a simplistic set of limit curves associated with a gain test. Each curve represents an input or output test requirement and the individual curves specify the test limits for each of these requirements. The ability to tie together all of these complex interactions into a uniform editing tool significantly simplifies the development process for a truly complex set of tests that have numerous dependencies and myriad data associated with them. The Gain Test Editor identifies for the developer all of the tests that must be performed, the interactions between these tests, and the ability to develop or edit the data associated with these requirements in a controlled environment. This makes the editor concept a very valuable tool for the developer and maintainer, but the editing environment does not end here.

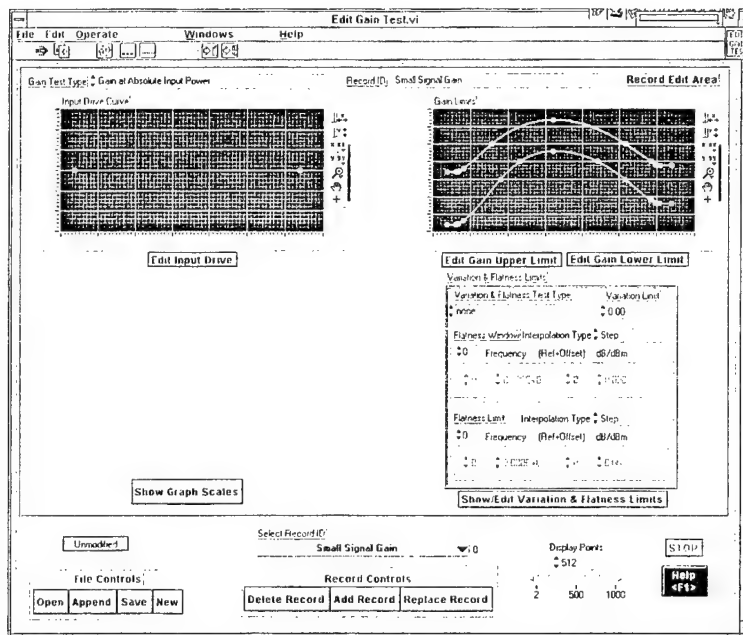


Figure 3-8 Gain Test Editor

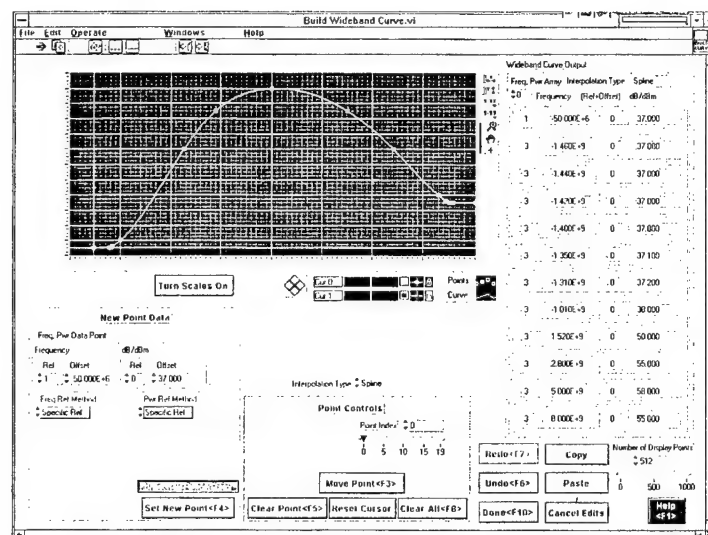


Figure 3-9 Wide Band Curve Editor

Robust correlation tools are integrated into the editing environment. The correlation tools automatically perform data integrity checks and look for the natural relationships that should be present in this complex series of tests. If items are reversed, missing, or

corrupted, the correlation tools will identify these errors to the developer. As each of the test specific requirements is entered, they use a standard graphical or data structure editor. The data structure can be used if numerical specification data is to be entered directly. However, if the requirements are flexible and a more intuitive method of creating the specification files are desired, we have included a "drag and drop" type of graphical editor, the Wide-Band Curve Editor in Figure 3-9. By minimizing the variation of editor types, we are able to lessen the software maintainer's burden while improving the editing environment. This minimizes the amount of software required to support development of individual test requirements while supporting maximum reuse of test development assets.

Finally, the instrumentation used to perform testing varies from user to user and test station to test station. Therefore, the MiCATSTM software utilizes a Data Driven Driver that eliminates the need to develop driver software when the instrumentation changes. By managing the instrument specific data with the Data Driven Driver Resource Editor, the need to develop new driver software, typically encountered with other development strategies, is eliminated in the MiCATSTM development environment. This enabled us to rapidly adapt to and use additional capabilities from the Vector Network Analyzer without the requirement to build additional driver software.

4. ALQ-184 CABLE TEST REPORTS

During execution of the ALQ-184 Cable Test software for WR-ALC/LNXXEJ we collected cable test data and numerous cable sets containing 8 to 16 cables per set. The report data for each of these cables is included in Appendix 1. These reports are generated by the test sequence reporting method and the Result Tool method. Additionally, all cable test data has been saved and provided in electronic form with the ALQ-184 Cable Test software.

5. CONCLUSION

By employing a more flexible design concept, component-based algorithm development practices, and sound software development principles, a once insurmountable problem has been solved. TASC and their Air Force partners, WR-ALC/LN and the Wright Laboratories Hardware and Software Division, have solved the scaleable microwave test challenge and created RATEMC compatible applications using the development tools. The time and cost reductions associated with applications development utilizing scaleable MiCATSTM software technology is very significant and sets the precedence for all future software development activities.

6. ALQ-184 Cable Test Results

Traveling Wave Tube Test Result

Test Name	Subtest Name	Result/Comments	Measured Value	Comparison	Lower Limit	Upper Limit	Execution Time
TEST REPORT	Test Sequence	C:\NARVEN\SEQUENCE\BIC\BIC1101C\DATA1					
	Derivation:						
	Date:	7/1/81					
	Time:	1:23 AM					
	Operator:	mls					
	Operating Level:	Exp/Eng					
UNIT INFORMATION	Unit Number:	Cat Validation					
	Vendor:	None					
	MSW:						
	Item Description:	Warning For Gun Cat Validation					
	System:						
	AUC:						
	Serial Number:						
	ICN:						
	First Maint:						
	SRO:						
TEST RESULTS	When On:						
	HOW HAL:						
	Top Pin:						
	Remarks:						
	Inspection Activity:						
	Circulation Code:						
	Discrepancy:						
	TEST RESULT:	UNIT PASSED	FALSE				
	TEST RESULTS						
	WBC Error:	SKIP					
VSWR TEST	VSWR OSL 12 Item Cat	SKIP					
	VSWR Test	SKIP					
	S11 VSWR Minimum w/ limit	PASS	1.000000	BOUL	1.100000	10.00 36.672	
	S11 VSWR Maximum w/ limit Frequency XFS	NOHE	0.000000	LOG			
	S22 VSWR Minimum w/ limit	PASS	1.000000	IE	1.100000		
	S22 VSWR Maximum w/ limit Frequency XFS	NOHE	0.000000	LOG			
	Phase Test	PASS		BOUL		21.10 25.565	
	Cat Validation Phase Minimum w/ limit	PASS	0.000000	GELE	0.500000	0.100000	
	Cat Validation Phase Maximum w/ limit Frequency XFS	NOHE	1.000000	LOG			
	Cat Validation Phase Minimum w/ limit	PASS	0.000000	GELE	0.500000	0.500000	
EXECUTION TIME	Cat Validation Phase Maximum w/ limit Frequency XFS	NOHE	10.000000	LOG			
	Cat Validation Phase Minimum w/ limit	PASS		BOUL		00.00 21.321	
	Cat Validation Loss Minimum w/ limit	PASS	0.000000	GE	0.000000		
	Cat Validation Loss Maximum w/ limit Frequency XFS	NOHE	0.000000	LOG			
	PreRun Execution Time						
	PostRun Execution Time						
	Total Test Execution Time:						
	Total QUT Execution Time:						
	Overhead	00.00 00.163	0.000000				

PAGE 1

Traveling Wave Tube Test Results

Test Name	Subtest Name	Result/Comments	Measured Value	Comparison	Lower Limit	Upper Limit	Execution Time
TEST REPORT							
	Test sequence:						
	Description:						
	Date:	11/18/88					
	Time:	9:31 AM					
	Operator:	mae					
	Operating Level:	Residuals					
UPH Information							
	Part Number:	101312-1					
	Vendor:	times					
	NSN:						
	Item Description:	Cable Assembly					
	Splices:	ALQ 114					
	WUC:						
	Serial Number:	2231					
	ICN:						
	Type Max AL:						
	SRD:						
	Wave Dist:						
	HOW MAX:						
	Fig No:						
	Attenuated Freq:						
	Impedance Actual:						
	Condition Code:						
	Occupancy:	re-calculated 50%					
		OUT FAILED					
TEST RESULT							
TEST RESULTS							
WEC Editor							
VIA OSC 12 Trim Cal							
VSWR Test							
	511 VSWR Minimum with limit		1.22000	200L	1.40000		00:00:18.16
	511 VSWR Maximum with limit Frequency MFS		86.862111	LOG			
	512 VSWR Minimum with limit		1.11000	LE	1.16000		
	512 VSWR Maximum with limit Frequency MFS		17.813108	LOG			
Phase Test							
	101312-1 Phase Minimum with limit		0.41000	200L	1.00000		00:00:21.176
	101312-1 Phase Maximum with limit Frequency MFS		1.75000	GETE			
	101312-1 Phase Minimum with limit		7.10000	LOG			
	101312-1 Phase Maximum with limit Frequency MFS		34.00000	GETE	6.00000		
Injection Test							
	101312-1 Injection Loss Minimum with limit		1.21000	200L	1.51000		00:00:20.710
	101312-1 Injection Loss Maximum with limit Frequency MFS		61.81110	LOG			
Phase Tracking							
EXECUTION TIME							
	PreRun Execution Time:						00:00:05.785
	PostRun Execution Time:						00:00:03.717
	Total Test Execution Time:						00:01:16
	Total UUT Execution Time:						00:01:25
	Operator:	00:00:10.110	0.800131A				

Traveling Wave Tube Test Results

Test Name	Subject Memo	Result/Comments	Measured Value	Comparison	Lower Limit	Upper Limit	Execution Time
TEST REPORT							
Test Sequence Description:		C:\ASV\EMSEQUENCE\1107CASHMTCB.DS.114					
Date:		7/11/11					
Time:		1:28 AM					
Operator:		mde					
Operating Mode:		AutoLog					
VOL Information							
File Number:		1014372-1					
Vendor:		Siemens					
USN:							
Item Description:		Cable Assembly					
Style:		A1Q 181					
MUC:							
Serial Number:		6013					
IDU:							
Type Mount:							
BRD:							
When Done:							
HOW MAL:							
Trip No:							
Remarks From:							
Inspector's Action:							
Condition Code:							
Discrepancy:							
TEST RESULT:		PASS					
TEST RESULTS							
WPC Editor							
VMA OSL 17 Item Cal							
VSWR Test							
S11 VSWR Maximum without limit		PASS	1.10500	EQ	1.05500		00:00:31.971
S11 VSWR Minimum without frequency XFS		HOLD	10.11465	LO			
S21 VSWR Maximum without limit		PASS	1.10050	EQ	1.00000		
S21 VSWR Minimum without frequency XFS		HOLD	51.01911	LO			
Phase Test							
1010372-1 Phase Minimum without limit		PASS	1.100000	EQ			00:00:10.716
1010372-1 Phase Minimum without frequency XFS		HOLD	75.18000	LO	\$ 000000		
1010372-1 Phase Minimum without limit		PASS	0.000000	EQ	\$ 000000		
1010372-1 Phase Minimum without frequency XFS		HOLD	91.750050	LO			
Insertion Loss Test							
1000372 Insertion Loss Minimum without limit		PASS	1.210000	EQ			00:00:27.070
1000372-1 Insertion Loss Minimum without frequency XFS		HOLD	75.675000	LO			
Phase Testing							
EXECUTION TIME							
PreRun Execution Time:							
PostRun Execution Time:							
Total Test Execution Time:							
Total VOL Execution Time:							
Detailed		00:00:40.246	0.711037K				

Traveling Wave Tube Test Results

A-27

Test Name	Subtest Name	Result/Comments	Measured Value	Completion	Lower Limit	Upper Limit	Execution Time
TEST REPORT							
	Test sequence:						
	Destination:						
	Date:						
	Time:	9:27 AM					
	Operator:	mlr					
	Operating level:	develop					
UUT Information							
	Part Number:	101312-1					
	Vendor:	Amtek					
	ASN:						
	Item Description:	Cable Assembly					
	System:	ALQ 181					
	WUC:						
	Serial Number:	3020					
	ICN:						
	ISA Model:						
	SRB:						
	Acen Desc:						
	ACN: MAL						
	Lot No:						
	Removed From:						
	Inspection Activity:						
	Craftman Code:						
	Discrepancy:						
TEST RESULTS		UUT PASSED	PASS				
WEC Error							
VNA ON 12 Term Cu							
VSWR Test							
	S11 VSWR Maximum with limit		1.150000	100%	1.250000		00:00:31.410
	S11 VSWR Minimum with limit Frequency MHz		16.715611	100%			
	S21 VSWR Maximum with limit		1.160000	100%	1.400000		
	S21 VSWR Minimum with limit Frequency MHz		16.715611	100%			
Phase Test							
	100312-1 Phase Minimum with limit		0.011000	100%	6.000000	6.050000	00:00:10.886
	100312-1 Phase Minimum with limit Frequency MHz		1.150000	100%			
	101312-1 Phase Maximum with limit		1.420000	100%	6.000000	6.000000	
	101312-1 Phase Maximum with limit Frequency MHz		11.410000	100%			
Insertion Loss Test							
	101312-1 Insertion Loss Minimum with limit		1.150000	100%	1.140000		00:00:13.111
	101312-1 Insertion Loss Minimum with limit Frequency MHz		11.220000	100%			
Phase Tracking							
EXECUTION TIME							
	PreRun Execution Time:						00:00:05.415
	PostRun Execution Time:						00:00:05.812
	Total Test Execution Time:						00:01:10
	Total UUT Execution Time:						00:01:38
	Overhead:	00:00:20.7	0.317018				

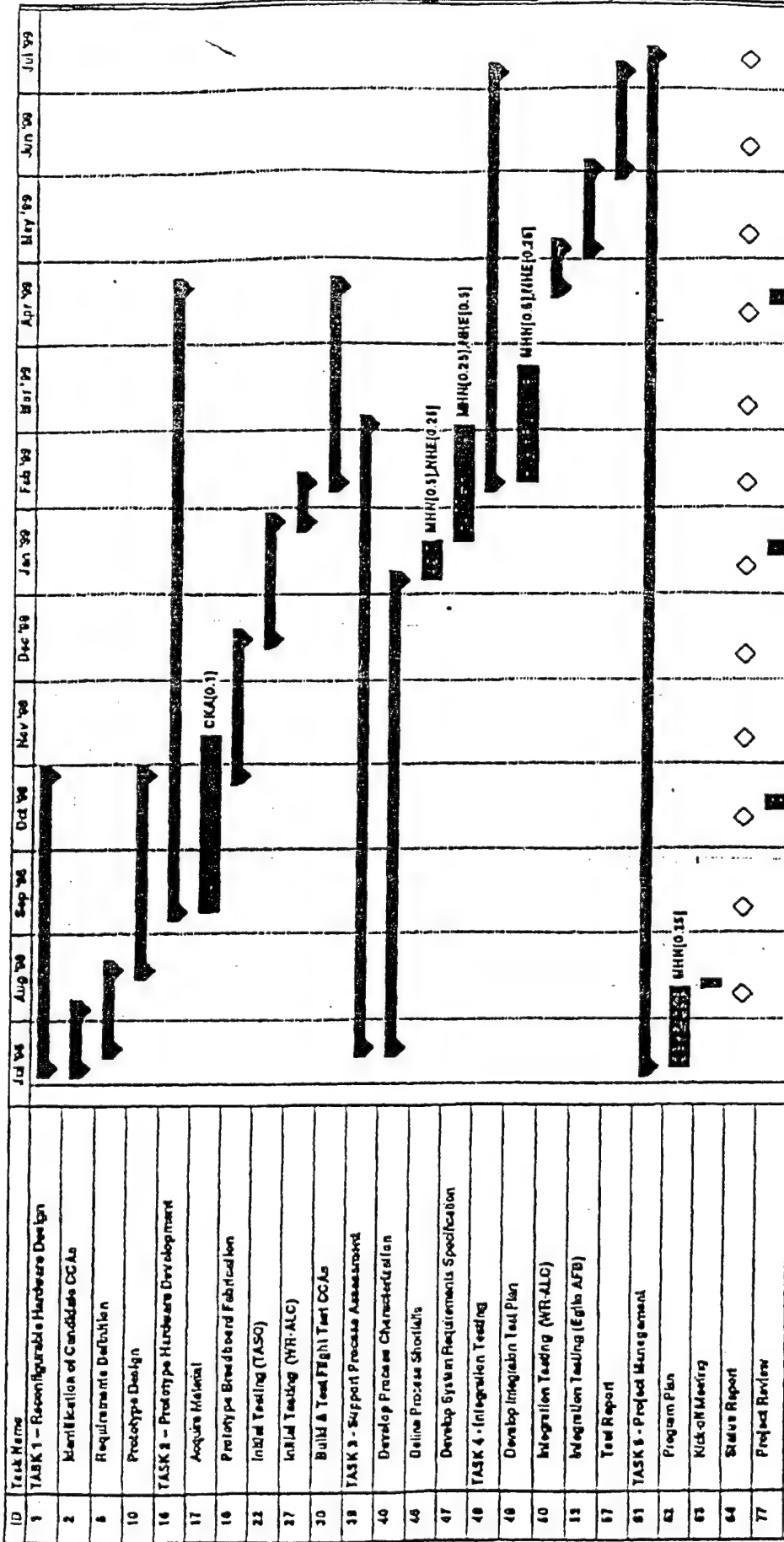
Test Name	Subtest Name	Result/Comments	Measured Value	Comparison	Lower Limit	Upper Limit	Execution Time
TEST REPORT							
	Test sequence:						
	Destination:						
	Time:						
	Options:						
	Operating level:						
.....							
UIT Information							
	Full Name:						
	Vendor:						
	ASN:						
	Item Description:						
	System:						
	MVC:						
	Serial Number:						
	JCH:						
	Type Model:						
	SRD:						
	When Due:						
	HOW MAX:						
	Tag No:						
	Removal From:						
	Inspection Activity:						
	Condition Code:						
	Discrepancy:						
TEST RESULT							
TEST RESULTS							
WBC Error							
VNA 051 12 Item Co.							
VSWR Test							
	S11 VSWR Minimum with limit						
	S11 VSWR Minimum with limit Frequency XFS						
	S22 VSWR Minimum with limit						
	S22 VSWR Minimum with limit Frequency XFS						
Phase Test							
	1010322-1 Phase Minimum with limit						
	1010322-1 Phase Minimum with limit Frequency XFS						
	1010322-1 Phase Minimum with limit						
	1010322-1 Phase Minimum with limit Frequency XFS						
Inspection Loss Test							
	1000322-1 Insertion Loss Minimum with limit						
	1000322-1 Insertion Loss Minimum with limit Frequency XFS						
Phase Testing							
EXECUTION TIME							
	Program Execution Time:						
	PostRun Execution Time:						
	Total Test Execution Time:						
	TotalUIT Execution Time:						
	Overhead						

[illegible]

Test Item	Subtest Name	Test Results	Measured Value	Comparison	Lower Limit	Upper Limit	Execution Time
TEST RESULT							
TEST RESULT							
WEC Error							
VMA OSI 12: Tim Cu							
VSWA Test							
	511 VSWA Maximum with limit	PASS	1.210000	1.000000	1.000000	1.400000	00:00:00.00
	511 VSWA Minimum with limit Frequency: NIS	FAIL	0.700000	1.000000	1.000000	1.400000	00:00:00.00
	520 VSWA Maximum with limit	PASS	1.000000	1.000000	1.000000	1.400000	00:00:00.00
	520 VSWA Minimum with limit Frequency: NIS	FAIL	0.700000	1.000000	1.000000	1.400000	00:00:00.00
Phase Test							
	500112: 1 Phase Maximum with limit	PASS	1.310000	1.000000	1.000000	1.400000	00:00:00.00
	100312: 1 Phase Minimum with limit Frequency: NIS	FAIL	0.700000	1.000000	1.000000	1.400000	00:00:00.00
	100312: 1 Phase Maximum with limit	PASS	1.000000	1.000000	1.000000	1.400000	00:00:00.00
	100312: 1 Phase Minimum with limit Frequency: NIS	FAIL	0.700000	1.000000	1.000000	1.400000	00:00:00.00
Injection Loss Test							
	103112: 1 Injection Loss Minimum with limit	PASS	1.200000	1.000000	1.000000	1.400000	00:00:00.00
	103112: 1 Injection Loss Minimum with limit Frequency: NIS	FAIL	0.700000	1.000000	1.000000	1.400000	00:00:00.00
Phase Tracking							
EXECUTION TIME							
	Pre Run Execution Time:						
	Post Run Execution Time:						
	Total Test Execution Time:						
	Test UUT Execution Time:						
	On Board:	00:00:00.205	0.221000				00:00:00.00

Travelling Wave Tube Test Results

Test Name	Subtest Name	Result/Comments	Measured Value	Comparison	Lower Limit	Upper Limit	Execution Time
TEST REPORT							
	Test Sequence:	C:\LABVIEW\SEQUENCE\TEST\CABLE\01Cable seq					
	Description:	01000					
	Date:	0-30 AM					
	Operator:	mht					
	Optical Level:	developed					
	Part Number:	1018372-1					
	Vendor:	lincs					
	NSK:						
	Item Description:	Cable Assembly					
	System:	AIO 164					
	MUC:						
	Serial Number:	1021					
	ICR:						
	Type Mark:						
	JRD:						
	Watin Date:						
	HOW MAT:						
	Lay kb:						
	Reinforced Fibre:						
	Impregnation Activity:						
	Cordline Code:						
	Outcomes:	PASS					
TEST RESULT:	OUT PASSED						
TEST RESULTS							
WBC Editor							
VNA OSL 12-Term Cal							
VSWR Test							
	S11 VSWR Minimum w/Limit	PASS	0.910000	GOOD	1.00000		00:00:24.831
	S11 VSWR Maximum w/Limit Frequency KFS	NONE	0.710000	LOG			
	S22 VSWR Minimum w/Limit	PASS	0.910000	GE	1.00000		
	S22 VSWR Maximum w/Limit Frequency KFS	NONE	0.710000	LOG			
	PASS						
	1031372-1 Phase Minimum w/Limit	PASS	-1.110000	GOOD	0.00000		00:00:19.801
	1031372-1 Phase Maximum w/Limit Frequency KFS	NONE	0.310000	LOG			
	1031372-1 Phase Minimum w/Limit	PASS	0.310000	GE	0.00000		
	1031372-1 Phase Maximum w/Limit Frequency KFS	NONE	0.310000	LOG			
	Insertion Loss Test	PASS	-1.110000	GOOD			
	1018372-1 Insertion Loss Minimum w/Limit	PASS	-1.110000	GE	1.250000		01:31:16.111
	1018372-1 Insertion Loss Maximum w/Limit Frequency KFS	NONE	0.710000	LOG			
	Phase Testing						
EXECUTION TIME							
	PreRun Execution Time:						00:00:06.100
	PostRun Execution Time:						00:00:03.100
	Total Test Execution Time:						00:01:16
	Total Out Execution Time:						00:01:26
	Overhead:	00:00:00.116	0.337610E				



Project: WRAP-ITPP
Date: Thu 7/8/99

Task
Progress

Milestone
Summary

Rollled Up Task
Rollled Up Milestone

Rollled Up Progress

A-34

Test Name	Subject Name	Result/Comments	Measured Value	Comparison	Lower Limit	Upper Limit	Execution Time
TEST REPORT							
Test Name:	CUASVIEWSEQUENCE	CUASVIEWSEQUENCE					
Test Run:	000000						
Date:	000000						
Time:	000000						
Operator:	000000						
Operating Unit:	000000						
Test Name:	CUASVIEWSEQUENCE	CUASVIEWSEQUENCE					
Test Run:	000000						
Date:	000000						
Time:	000000						
Operator:	000000						
Operating Unit:	000000						
Test Name:	CUASVIEWSEQUENCE	CUASVIEWSEQUENCE					
Test Run:	000000						
Date:	000000						
Time:	000000						
Operator:	000000						
Operating Unit:	000000						
Test Name:	CUASVIEWSEQUENCE	CUASVIEWSEQUENCE					
Test Run:	000000						
Date:	000000						
Time:	000000						
Operator:	000000						
Operating Unit:	000000						
Test Name:	CUASVIEWSEQUENCE	CUASVIEWSEQUENCE					
Test Run:	000000						
Date:	000000						
Time:	000000						
Operator:	000000						
Operating Unit:	000000						
Test Name:	CUASVIEWSEQUENCE	CUASVIEWSEQUENCE					
Test Run:	000000						
Date:	000000						
Time:	000000						
Operator:	000000						
Operating Unit:	000000						
Test Name:	CUASVIEWSEQUENCE	CUASVIEWSEQUENCE					
Test Run:	000000						
Date:	000000						
Time:	000000						
Operator:	000000						
Operating Unit:	000000						
Test Name:	CUASVIEWSEQUENCE	CUASVIEWSEQUENCE					
Test Run:	000000						
Date:	000000						
Time:	000000						
Operator:	000000						
Operating Unit:	000000						
Test Name:	CUASVIEWSEQUENCE	CUASVIEWSEQUENCE					
Test Run:	000000						
Date:	000000						
Time:	000000						
Operator:	000000						
Operating Unit:	000000						
Test Name:	CUASVIEWSEQUENCE	CUASVIEWSEQUENCE					
Test Run:	000000						
Date:	000000						
Time:	000000						
Operator:	000000						
Operating Unit:	000000						
Test Name:	CUASVIEWSEQUENCE	CUASVIEWSEQUENCE					
Test Run:	000000						
Date:	000000						
Time:	000000						
Operator:	000000						
Operating Unit:	000000						
Test Name:	CUASVIEWSEQUENCE	CUASVIEWSEQUENCE					
Test Run:	000000						
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Time:	000000						
Operator:	000000						
Operating Unit:	000000						
Test Name:	CUASVIEWSEQUENCE	CUASVIEWSEQUENCE					
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Operator:	000000						
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Test Name:	CUASVIEWSEQUENCE	CUASVIEWSEQUENCE					
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Test Name:	CUASVIEWSEQUENCE	CUASVIEWSEQUENCE					
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Test Name:	CUASVIEWSEQUENCE	CUASVIEWSEQUENCE					
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Operator:	000000						
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Test Name:	CUASVIEWSEQUENCE	CUASVIEWSEQUENCE					
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Operator:	000000						
Operating Unit:	000000						
Test Name:	CUASVIEWSEQUENCE	CUASVIEWSEQUENCE					
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Operator:	000000						
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Operating Unit:	000000						
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Operating Unit:	000000						
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Operating Unit:	000000						
Test Name:	CUASVIEWSEQUENCE	CUASVIEWSEQUENCE					
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Operating Unit:	000000						
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Operating Unit:	000000						
Test Name:	CUASVIEWSEQUENCE	CUASVIEWSEQUENCE					
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Operator:	000000						
Operating Unit:	000000						
Test Name:	CUASVIEWSEQUENCE	CUASVIEWSEQUENCE					
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Operator:	000000						
Operating Unit:	000000						
Test Name:	CUASVIEWSEQUENCE	CUASVIEWSEQUENCE					
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Operator:	000000						
Operating Unit:	000000						
Test Name:	CUASVIEWSEQUENCE	CUASVIEWSEQUENCE					
Test Run:	000000						
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Operator:	000000						
Operating Unit:	000000						
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Test Name:	CUASVIEWSEQUENCE	CUASVIEWSEQUENCE					
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Operator:	000000						
Operating Unit:	000000						
Test Name:	CUASVIEWSEQUENCE	CUASVIEWSEQUENCE					
Test Run:	000000						
Date:	000000						
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Operator:	000000						
Operating Unit:	000000						
Test Name:	CUASVIEWSEQUENCE	CUASVIEWSEQUENCE					
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Test Name:	CUASVIEWSEQUENCE	CUASVIEWSEQUENCE					
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Test Name:	CUASVIEWSEQUENCE	CUASVIEWSEQUENCE					
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Operating Unit:	000000						
Test Name:	CUASVIEWSEQUENCE	CUASVIEWSEQUENCE					
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Operator:	000000						
Operating Unit:	000000						
Test Name:	CUASVIEWSEQUENCE	CUASVIEWSEQUENCE					
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Operator:	000000						
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Test Name:	CUASVIEWSEQUENCE	CUASVIEWSEQUENCE					
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Operator:	000000						
Operating Unit:	000000						
Test Name:	CUASVIEWSEQUENCE	CUASVIEWSEQUENCE					
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Test Name:	CUASVIEWSEQUENCE	CUASVIEWSEQUENCE					
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Test Name:	CUASVIEWSEQUENCE	CUASVIEWSEQUENCE					
Test Run:	000000						
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Operating Unit:	000000						
Test Name:	CUASVIEWSEQUENCE	CUASVIEWSEQUENCE					
Test Run:	000000						
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Test Name:	CUASVIEWSEQUENCE	CUASVIEWSEQUENCE					
Test Run:	000000						
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Test Name:	CUASVIEWSEQUENCE	CUASVIEWSEQUENCE					
Test Run:	000000						
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Operator:	000000						
Operating Unit:	000000						
Test Name:	CUASVIEWSEQUENCE	CUASVIEWSEQUENCE					
Test Run:	000000						
Date:	000000						
Time:	000000						
Operator:	000000						
Operating Unit:	000000						
Test Name:	CUASVIEWSEQUENCE	CUASVIEWSEQUENCE					
Test Run:	000000						

[illegible]

2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25 26 27 28 29 30 31 32 33 34 35 36 37 38 39 40 41 42 43 44 45 46 47 48 49 50 51 52 53 54 55 56 57 58 59 60 61 62 63 64 65 66 67 68 69 70 71 72 73 74 75 76 77 78 79 80 81 82 83 84 85 86 87 88 89 90 91 92 93 94 95 96 97 98 99 100 101 102 103 104 105 106 107 108 109 110 111 112 113 114 115 116 117 118 119 120 121 122 123 124 125 126 127 128 129 130 131 132 133 134 135 136 137 138 139 140 141 142 143 144 145 146 147 148 149 150 151 152 153 154 155 156 157 158 159 160 161 162 163 164 165 166 167 168 169 170 171 172 173 174 175 176 177 178 179 180 181 182 183 184 185 186 187 188 189 190 191 192 193 194 195 196 197 198 199 200 201 202 203 204 205 206 207 208 209 210 211 212 213 214 215 216 217 218 219 220 221 222 223 224 225 226 227 228 229 230 231 232 233 234 235 236 237 238 239 240 241 242 243 244 245 246 247 248 249 250 251 252 253 254 255 256 257 258 259 260 261 262 263 264 265 266 267 268 269 270 271 272 273 274 275 276 277 278 279 280 281 282 283 284 285 286 287 288 289 290 291 292 293 294 295 296 297 298 299 300 301 302 303 304 305 306 307 308 309 310 311 312 313 314 315 316 317 318 319 320 321 322 323 324 325 326 327 328 329 330 331 332 333 334 335 336 337 338 339 340 341 342 343 344 345 346 347 348 349 350 351 352 353 354 355 356 357 358 359 360 361 362 363 364 365 366 367 368 369 370 371 372 373 374 375 376 377 378 379 380 381 382 383 384 385 386 387 388 389 390 391 392 393 394 395 396 397 398 399 400 401 402 403 404 405 406 407 408 409 410 411 412 413 414 415 416 417 418 419 420 421 422 423 424 425 426 427 428 429 430 431 432 433 434 435 436 437 438 439 440 441 442 443 444 445 446 447 448 449 450 451 452 453 454 455 456 457 458 459 460 461 462 463 464 465 466 467 468 469 470 471 472 473 474 475 476 477 478 479 480 481 482 483 484 485 486 487 488 489 490 491 492 493 494 495 496 497 498 499 500 501 502 503 504 505 506 507 508 509 510 511 512 513 514 515 516 517 518 519 520 521 522 523 524 525 526 527 528 529 530 531 532 533 534 535 536 537 538 539 540 541 542 543 544 545 546 547 548 549 550 551 552 553 554 555 556 557 558 559 560 561 562 563 564 565 566 567 568 569 570 571 572 573 574 575 576 577 578 579 580 581 582 583 584 585 586 587 588 589 590 591 592 593 594 595 596 597 598 599 600 601 602 603 604 605 606 607 608 609 610 611 612 613 614 615 616 617 618 619 620 621 622 623 624 625 626 627 628 629 630 631 632 633 634 635 636 637 638 639 640 641 642 643 644 645 646 647 648 649 650 651 652 653 654 655 656 657 658 659 660 661 662 663 664 665 666 667 668 669 670 671 672 673 674 675 676 677 678 679 680 681 682 683 684 685 686 687 688 689 690 691 692 693 694 695 696 697 698 699 700 701 702 703 704 705 706 707 708 709 710 711 712 713 714 715 716 717 718 719 720 721 722 723 724 725 726 727 728 729 730 731 732 733 734 735 736 737 738 739 740 741 742 743 744 745 746 747 748 749 750 751 752 753 754 755 756 757 758 759 760 761 762 763 764 765 766 767 768 769 770 771 772 773 774 775 776 777 778 779 780 781 782 783 784 785 786 787 788 789 790 791 792 793 794 795 796 797 798 799 800 801 802 803 804 805 806 807 808 809 810 811 812 813 814 815 816 817 818 819 820 821 822 823 824 825 826 827 828 829 830 831 832 833 834 835 836 837 838 839 840 841 842 843 844 845 846 847 848 849 850 851 852 853 854 855 856 857 858 859 860 861 862 863 864 865 866 867 868 869 870 871 872 873 874 875 876 877 878 879 880 881 882 883 884 885 886 887 888 889 890 891 892 893 894 895 896 897 898 899 900 901 902 903 904 905 906 907 908 909 910 911 912 913 914 915 916 917 918 919 920 921 922 923 924 925 926 927 928 929 930 931 932 933 934 935 936 937 938 939 940 941 942 943 944 945 946 947 948 949 950 951 952 953 954 955 956 957 958 959 960 961 962 963 964 965 966 967 968 969 970 971 972 973 974 975 976 977 978 979 980 981 982 983 984 985 986 987 988 989 990 991 992 993 994 995 996 997 998 999 1000 1001 1002 1003 1004 1005 1006 1007 1008 1009 1010 1011 1012 1013 1014 1015 1016 1017 1018 1019 1020 1021 1022 1023 1024 1025 1026 1027 1028 1029 1030 1031 1032 1033 1034 1035 1036 1037 1038 1039 1040 104

[illegible]

Traveling Wave Tube Test Results

Test Name	Subject Name	Result/Comments	Measured Value	Comparison	Lower Limit	Upper Limit	Execution Time
TEST REPORT							
	Test Sequence:	C-Matrix Sequence Identification					
	Date:	10/11					
	Time:	1:31 PM					
	Operator:	JOAER					
	Operating Test:	Upstream					
UUT Information							
	Part Number:	103112-1					
	Vendor:	Intel					
	Item Description:	Cache Assembly					
	System:	100111					
	WUC:						
	Serial Number:	0021					
	ICN:						
	Type Model:						
	SRD:						
	When Data:						
	HOW MAT:						
	Fig No:						
	Demoted Frac:						
	Inspection Activity:						
	Condition Code:						
	Discrepancy:						
TEST RESULT:		UUT FAILED					
TEST RESULTS							
MEC Letter		SKIP					
QMA LSL 12 Test Gal		SKIP					
VSWR Test		PASS					
	S11 VSWR Maximum with limit	PASS	1.20000	9001			
	S11 VSWR Minimum with limit Frequency MFS	FAIL	92.210516	1E	1.00000		00:00:22.712
	S22 VSWR Maximum with limit	PASS	1.74000	1E	1.00000		
	S22 VSWR Minimum with limit Frequency MFS	NOHE	35.73330	LOG			
Phase Test		PASS					
	103112-1 Phase Minimum with limit	PASS	1.81000	9001			
	103112-1 Phase Minimum with limit Frequency MFS	NOHE	6.115000	LOG	5.000000	1.000000	
	103112-1 Phase Maximum with limit	PASS	0.160000	LOG	5.000000	5.000000	
	103112-1 Phase Maximum with limit Frequency MFS	NOHE	16.410000	LOG			
Insertion Loss Test		FAIL					
	103112-1 Insertion Loss Minimum with limit	FAIL	1.350000	9001			00:01:43
	103112-1 Insertion Loss Minimum with limit Frequency MFS	NOHE	96.210000	LOG	1.200000		
Phase Matching		STOP					
EXECUTION TIME							
	Pin Run Execution Time:						
	Post Run Execution Time:						00:00:01.021
	Total Test Execution Time:						00:00:05.418
	Total UUT Execution Time:						00:01:30
	Overhead	00:00:40.168	0.150771N				00:02:49

A-39

Traveling Wave Tube Test Results

Test Name	Subtest Name	Result/Comments	Measured Value	Comparison	Lower Limit	Upper Limit	Execution Time
TEST REPORT							
	Test sequence:						
	Description:						
	Date:	10/11/11					
	Time:	3:15 PM					
	Operator:	JOHN F					
	Operating level:	unknown					
UUT Information							
	Part Number:	1013121-1					
	Vendor:	Boon					
	UUT:						
	Item Description:	Cable Assembly					
	System:	A10 101					
	RUC:						
	Serial Number:	0076					
	ICM:						
	Type Mark:						
	When Rec:						
	HOW Mkt:						
	Tag No:						
	Removal Date:						
	Inspection Authority:						
	Condition Code:						
	Outgoing:						
TEST RESULT		PASS					
TEST RESULTS							
WRC Editor							
VNA OSL 12-Term Cal							
VSWR Test							
	S11 VSWR Minimum with limit		1.0000	0001	1.0000		26.00 24.723
	S11 VSWR Maximum with limit Frequency: N/A		1.0000	0001	1.0000		
	S22 VSWR Minimum with limit		1.0000	0001	1.0000		
	S22 VSWR Maximum with limit Frequency: N/A		1.0000	0001	1.0000		
Phase Test							
	1013121-1 Phase Minimum with limit		1.0000	0001	1.0000		00.00 19.417
	1013121-1 Phase Minimum with limit Frequency: N/A		1.0000	0001	1.0000		
	1013121-1 Phase Maximum with limit		1.0000	0001	1.0000		
	1013121-1 Phase Maximum with limit Frequency: N/A		1.0000	0001	1.0000		
Minimum Loss Test							
	1013121-1 Insertion Loss Minimum with limit		1.0000	0001	1.0000		01.00 26.017
	1013121-1 Insertion Loss Minimum with limit Frequency: N/A		1.0000	0001	1.0000		
Phase Tracking							
EXECUTION TIME							
	Probe Execution Time:						
	PostRun Execution Time:						
	Total Test Execution Time:						00.00 13.1
	Total UUT Execution Time:						00.00 13.1
	Overhead:						00.00 13.1

1 / 1

Traveling Wave Tube Test Results

[illegible]

Test Name	Subtest Name	Result/Comments	Measured Value	Comparison	Lower Limit	Upper Limit	Execution Time
TEST REPORT							
.....							
UUT Information							
	Test Equipment:	C:\HARVEY\SEQUENCE\CHM\HCUR100					
	Date:	7/1/98					
	Time:	6:15 PM					
	Operator:	JONES					
	Operating Level:	Initiation					
	Part Number:	1008372-1					
	Vendor:	Tins					
	MFR:						
	Item Description:	Cable Assembly					
	System:	AIO 101					
	WUC:						
	Serial Number:	522					
	ICN:						
	Type Winc:						
	SRD:						
	White Out:						
	HQW MAL:						
	Fig No:						
	Removed From:						
	Inspection Activity:						
	Condition Code:						
	Outgoing:						
		UUT PASSED	PASS				
		SKIP					
		SKIP					
		PASS					
	S11 VSWR Minimum without Frequency MFS		1.730E+0	GOOD	1.400000		00 00 31.112
	S11 VSWR Maximum without Frequency MFS		61.81175	LOG			
	S21 VSWR Minimum without		1.300000	LE	1.000000		
	S22 VSWR Minimum without Frequency MFS		10.215811	LOG			
		NONE					
		PASS					
	1008372-1 Phase Minimum without		1.11000E+	GOOD	1.014000		00 03 27
	1008372-1 Phase Minimum without Frequency MFS		10.102100	LOG			
	1008372-1 Phase Minimum without		1.310010	GOOD	6.000000		
	1008372-1 Phase Minimum without Frequency MFS		11.671850	LOG			
		PASS					
	1008372-1 Insertion Loss Minimum without		1.110E+00	DE	1.210000		00 03 55.716
	1008372-1 Insertion Loss Minimum without Frequency MFS		81.315000	LOG			
		NONE					
		SKIP					
	Total Execution Time:						
	Posttest Execution Time:						03 03 07.376
	Total Test Execution Time:						00 00 01.168
	Total UUT Execution Time:						00 01 57
	Overhead:	00 00 00.721	0 013600A				00 05 00

[illegible]

LRU/SRU NOMENCLATURE	P/N	VENDOR	NSN	QPA	WUC	SMR CODE	MTBF/ MTBM	# OF SPARES PROVISION	2 VS. 3 LEVEL	WEIGHT	CI INC
APQ-180 Radar							143.09				
Transmitter, Radar	3173111-105	Hughes	5841-01-294-7948	1	72VAE		1521/229.6	0	3	188	
Circuit Card Assembly	5003252-10	*	5998-01-310-7478	1				?			
Transmitter Subassy	3249015-5	*	5841-01-107-2137	1				?			
Radar Modulator	3334045-10	*	5841-01-224-7835	1				?			
Radar Data Processor	5002060-10	*	5841-01-299-3515	1				?			
Radar Set Subassembly	5081302-15	*	5841-01-303-0403	1				?			
Detector Assembly	3334220-10	*	N/A	1		AFFDDT		?			
Power Supply	5001940	*	6130-01-226-1154	1				?			
Solenoid Power Supply	3334270-2	*	5841-01-407-5880	1				?			
Radar Rcvr/Exciter	3173025-115	*	5841-01-319-0648	1	72VBO		2487/250.65	0	3	63	
Filter Assembly	5002880	*	5841-01-224-7751	1				?			
RF Electronics	5002440-5	*	5841-01-328-8234	1				?			
IF Electronics	5002490	*	5841-01-228-1171	1				?			
Volt Reg/Fmr Calib	5002580	*	5841-01-226-5530	1				?			
Trans. Driver Gen.	5002810-10	*	5895-01-302-2078	1				?			
Trans. Driver Offset	5002660-1	*	5841-01-267-8662	1				?			
Local Oscil Gen.	5002710-1	*	5841-01-297-8078	1				?			
Ref Oscil Gen.	5002780-1	*	5841-01-267-7708	1				?			
Unit Control	5002860-1	*	5841-01-267-8737	1				?			
Intra-Radar Mux Bus	5002890	*	5841-01-231-9895	1				?			
Signal Processor	3173044-115	*	5841-01-284-3965	1	72VAA		600/416.56	0	3	60	
Display Interface	5042380-5	*	5999-01-281-8861	1				?			
Input Data Processor	5042370-5	*	5998-01-285-1282	1				?			
IRE/ASC	5042390	*	5841-01-227-4735	1				?			
Array Control Aux.	5042360-5	*	5999-01-279-7171	1				?			
Cent Proc Unit (CPU)	3582119-10	*	5998-01-299-8666	1				?			
Processor Pipeline	5042330-6	*	5999-01-279-3555	1				?			
Data Memory Struct	5042320-1	Hughes	5999-01-279-7172	1				?			
Inst Sequence Logic	5042310	*	5841-01-226-5538	1				?			
Global Bulk Mem Cont	5042350-3	*	5998-01-226-5535	1				?			
Global Bulk Memory	5042140	*	5998-01-296-1434	1				?			
Linear Regulator	5002942	*	6110-01-224-4330	1				?			
AC/DC Converter	5002902	*	6130-01-226-1155	1				?			

INTERNAL USE ONLY/SDXI

A-46

LRU/SRU NOMENCLATURE	P/N	VENDOR	NSN	QPA	WUC	SMR CODE	MTBF/MTBM	# OF SPARES PROVISION	2 VS. 3 LEVEL	WEIGHT	IN
Analog/Digital Convert.	3173037-100	*	5895-01-310-0160	1	72VAF	PAODDT	195.48	5	3	70	1F
Chassis	5091575	*									
High Ppt	5043220-15	*	5998-01-299-8047	1		PAFDD		?			
(P) (A2)											
Gain Cont Amp	5091580-5	*	5998-01-328-4716	1		PAFLDT		2		48	2
11 Bit A/D	5039960-7	*	5998-01-356-4392	1		PAFDD		?			
VFO	5065490	*	5998-01-285-7495	1		PAFDD		?			
(P) (A5)											
6 Bit A/D-Interface	5091590-10	*	5998-01-328-4725	1		PAFLDT		2		48	2
(P) (A6)											
Priority Buffer	5091600	*	5998-01-328-4726	1		PAFDDT		2		48	2
I/O Log/Tim Cont.	5065480	*	5998-01-268-6188	1		PAFDD		?			
Dage/Micro Processor (A8)	5065420-65	*	5998-01-310-2196	1		PAFDAT		3		48	2
Linear Regulator	5002300-5	*	5841-01-311-2851	1		PAFDD		?			
Power Supply	5002210-15	*	6130-01-282-8769	1		PAFDD		?			
Cable Assy	5091577	*		1		PAFFFP		?			
Cable Assy	5091578	*		1		PAFFFP		?			
Data Processor	3173082-105	*	5841-01-290-5864	1	72VAB		718/453.25	0	3	53	
Inter Nav Set (INS)	3562124-5	*	5998-01-279-6050	1				?			
AIO/DO	3562114-10	*	5998-01-279-6048	1				?			
RSP Wall Clock	3562120-15	*	5998-01-293-1546	1				?			
Can Comp/Dig Input	3562121-15	*	5998-01-318-0303	1				?			
I/O Bus Controller	3562122-10	*	5998-01-268-6188	1				?			
Cent Proc Unit (CPU)	3562119-10	*	5998-01-299-8666	1				?			
Memory Controller	3562191	*	5998-01-292-2801	1				?			
Working Memory	3562113-15	*	5998-01-312-6075	1		PAFDDT		?			
Firm Memory	3562165	*	5998-01-297-7764	1		PAFDDT		?			
Linear Regulator	5002230	*	5998-01-217-6746	1		PADDDT		?			
Antenna	3173032-100	Hughes	5885-01-309-4085	1	72VAC	PAODDT	147.87	14	3	131	
Antenna Assy	50855568	*		1		PAFDDT		1			
Disk Brake Assy	6239153	*		1		PAFDDT		2			
Valve Assy Hyd	6239152	*		1		PAFFFP		?			
Gimbal Assy	6239140	*		1		PADDDT		2			
Inst. Assy Read	6239209	*		1		PAFDDT		1			
Inst. Assy REA	6239210	*		1		PAFDDT		1			
Hyd Manifold	6239201	*		1		PADDDT		1			
Cable Wrap	6239187	*		1		PAFFFP		1			
Wiring Harness	6239192	*		1		PAFDDT		3			
LV Power Supply	3173815-100	*	6130-01-309-3092	1	72VAH	PAODDT	5374/1198.31	6	3	42	1
(A 1)											
Circuit Card Assembly	3569820	*	5998-01-158-5207	1		PAFLD		?			
(P) (A2)											
LV Dir Current	5085628	*	5998-01-328-8779	1		PAFLDT		2			
(A 3)											
Voltage Regulator	3569970-20	*	6110-01-123-0868	1		PAFLD		?			
(P) (A4)											
Control Amp	6237440	*	5998-01-329-0760	1		PAFLDT		2			
(P) (A5)											
A/E Elect. Control	6237450	*	5998-01-328-8820	1		PAFLDT		2			
(P) (A6)											
LV Power Sub Ass	5091590-10	*	6130-01-328-4680	1		PAFDDT		2			
Chassis	5058625	*		1		XB		?			
Bonded Assembly	3556300	*	5841-01-122-8684	1		XB		?			
Indicator Assy Fault	5085685	*		1		PAFFFP		?			

As of: 4/21/98 at 12:02 PM